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Coyer et al.

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(54) **SYSTEM AND METHOD FOR ASSISTING AN AGENT DURING A CLIENT INTERACTION**

(71) Applicant: **West Corporation**, Omaha, NE (US)

(72) Inventors: **Daniel A. Coyer**, Dunedin, FL (US); **Ryan L. Techlin**, Hortonville, WI (US); **Jeremy T. Tellock**, Appleton, WI (US); **Dennis C. White**, Arvada, CO (US); **Shelley A. Wildenberg**, Crivitz, WI (US)

(73) Assignee: **WEST CORPORATION**, Omaha, NE (US)

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G06F 9/451	(2018.01)
G10L 15/08	(2006.01)
G06F 3/16	(2006.01)
G06F 16/33	(2019.01)
G06F 16/9535	(2019.01)
G10L 15/22	(2006.01)

(52) **U.S. Cl.**
CPC ***G06F 9/451*** (2018.02); ***G06F 3/167*** (2013.01); ***G06F 16/3334*** (2019.01); ***G06F 16/9535*** (2019.01); ***G10L 15/08*** (2013.01); *G10L 15/22* (2013.01); *G10L 2015/088* (2013.01); *G10L 2015/223* (2013.01)

(58) **Field of Classification Search**
CPC G06F 17/30; G06F 9/451
See application file for complete search history.

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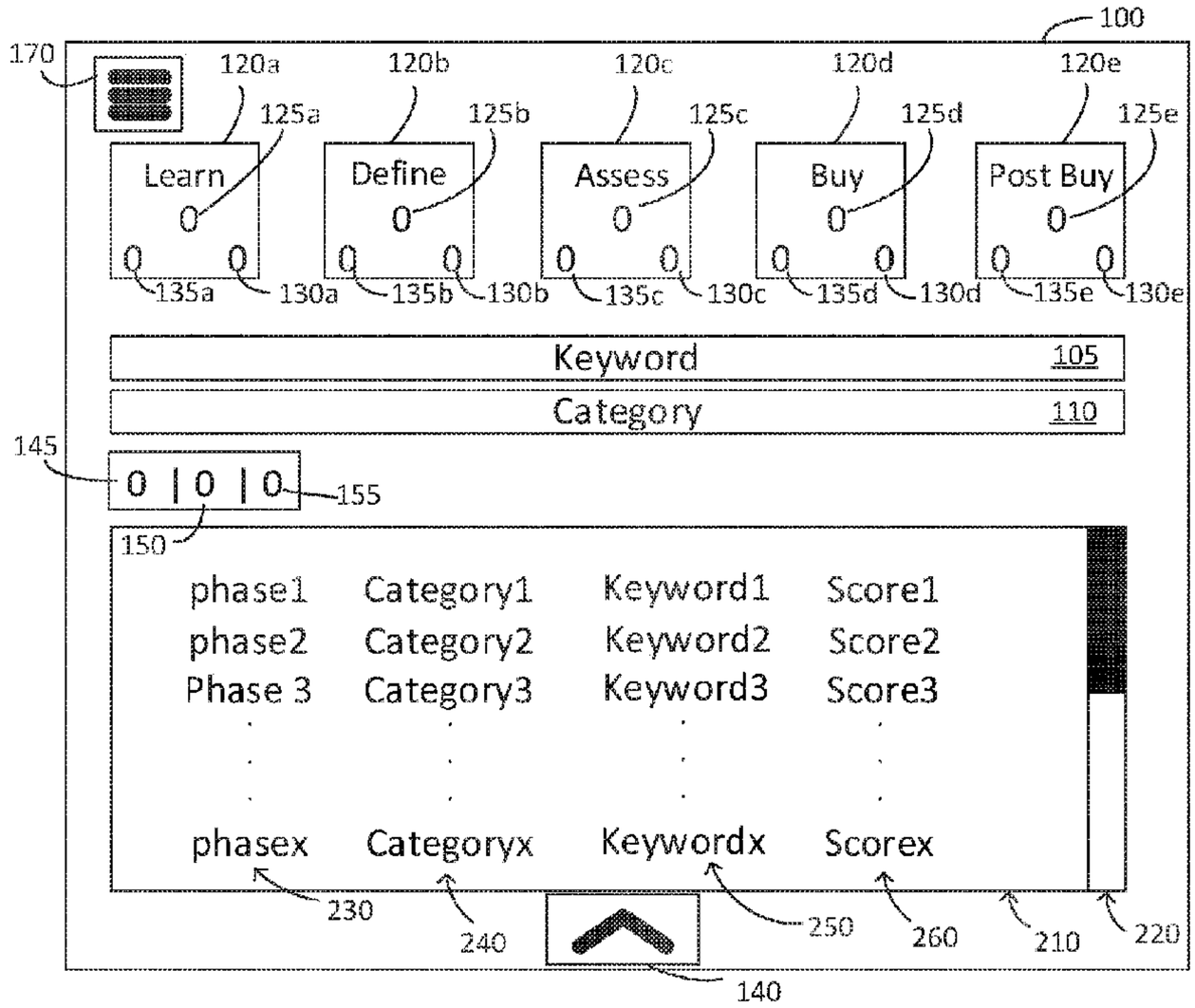
Primary Examiner — Andrea C Leggett

(57) **ABSTRACT**

A computing system, method and non-transitory computer readable memory are provided, to assist an agent during a client interaction between the agent and a client over a communications channel. An agent station may generate a graphic user interface (GUI) of the client interaction during the client interaction, the GUI displaying a current identified keyword and one or more interaction phases, each interaction phase having a respective current phase score for the client interaction. A keyword and associated keyword information from the client interaction may be received, including phase and corresponding phase score information, and the GUI updated with the currently identified keyword and newly received phase information accounting for the received corresponding phase score information.

20 Claims, 11 Drawing Sheets



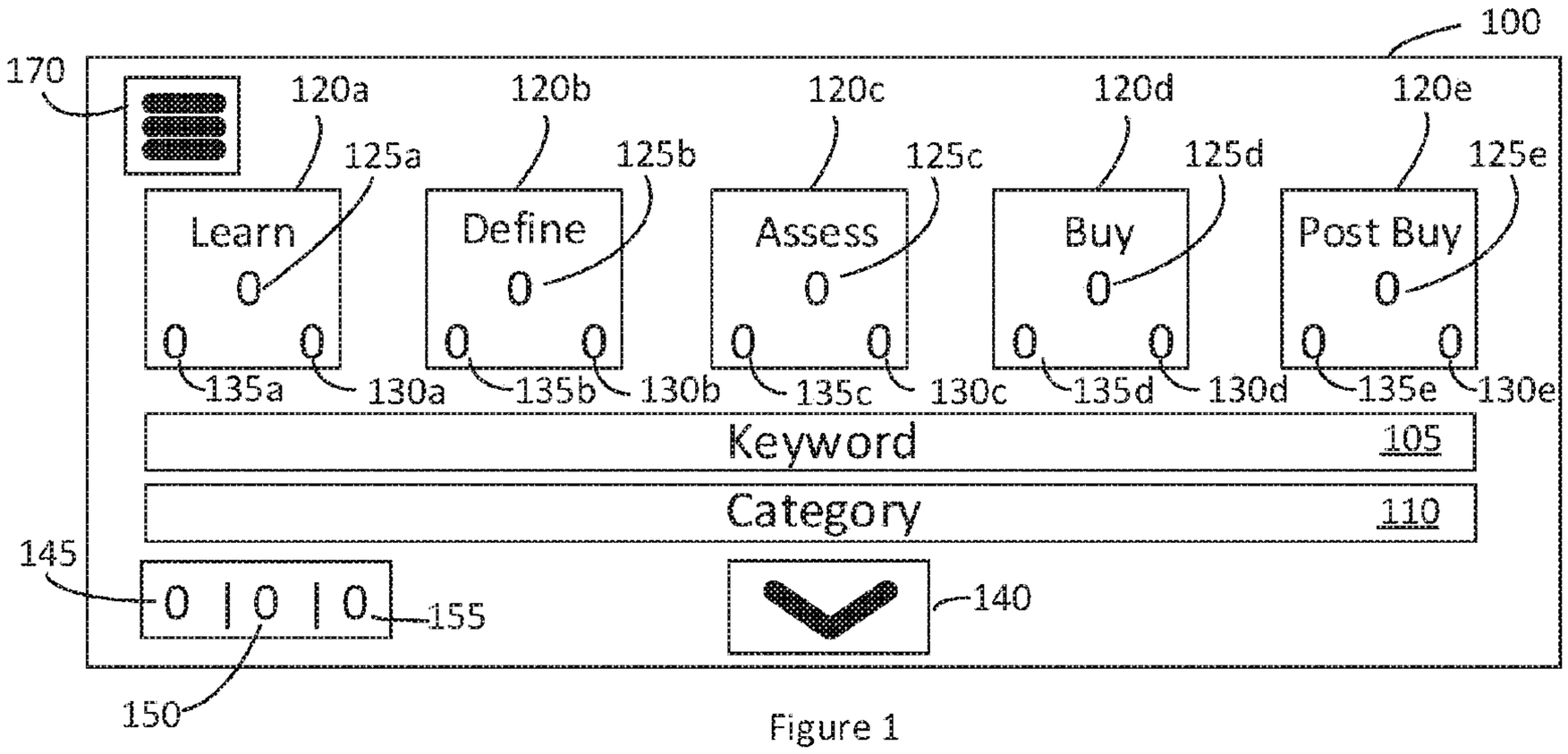


Figure 1

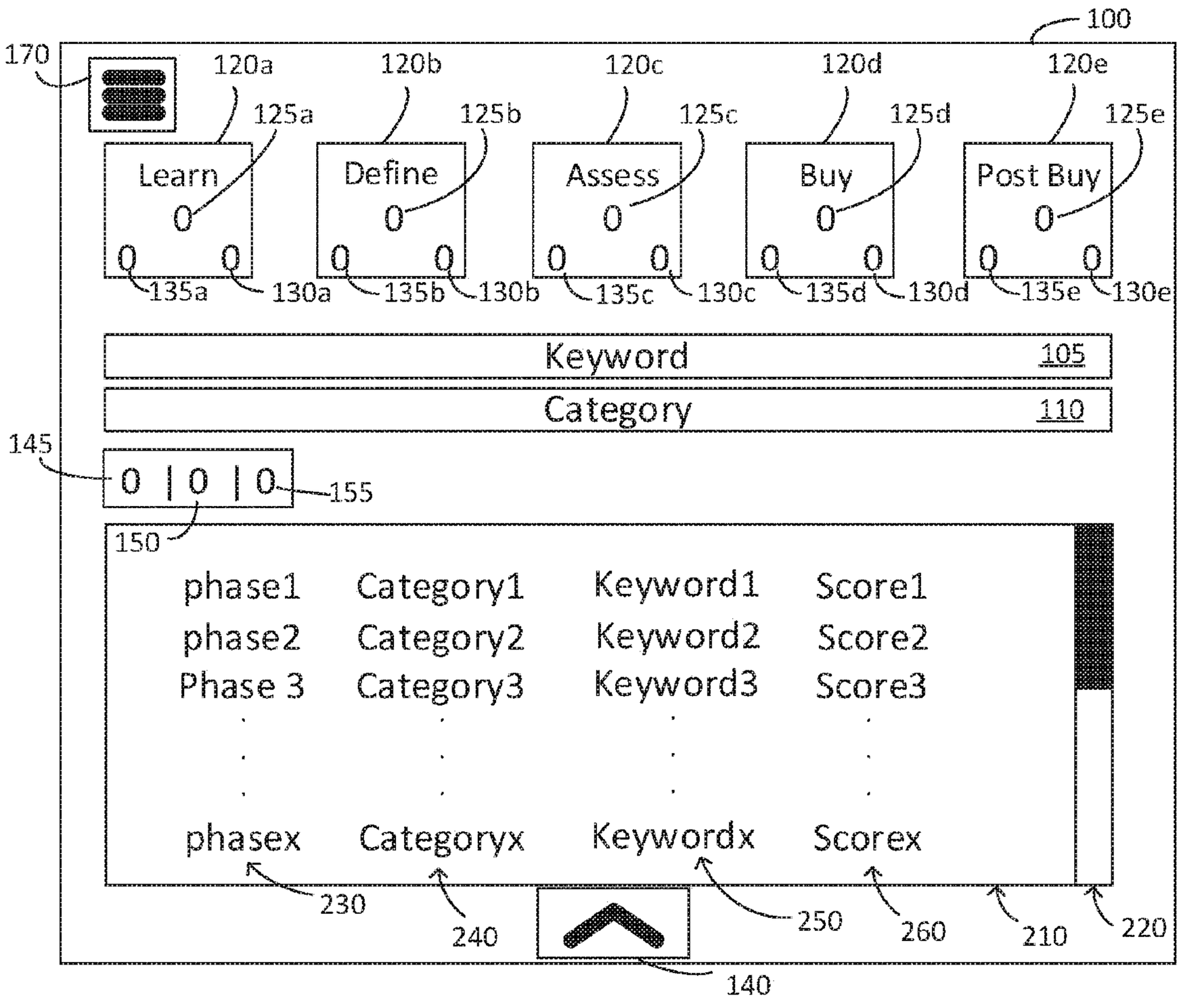


Figure 2

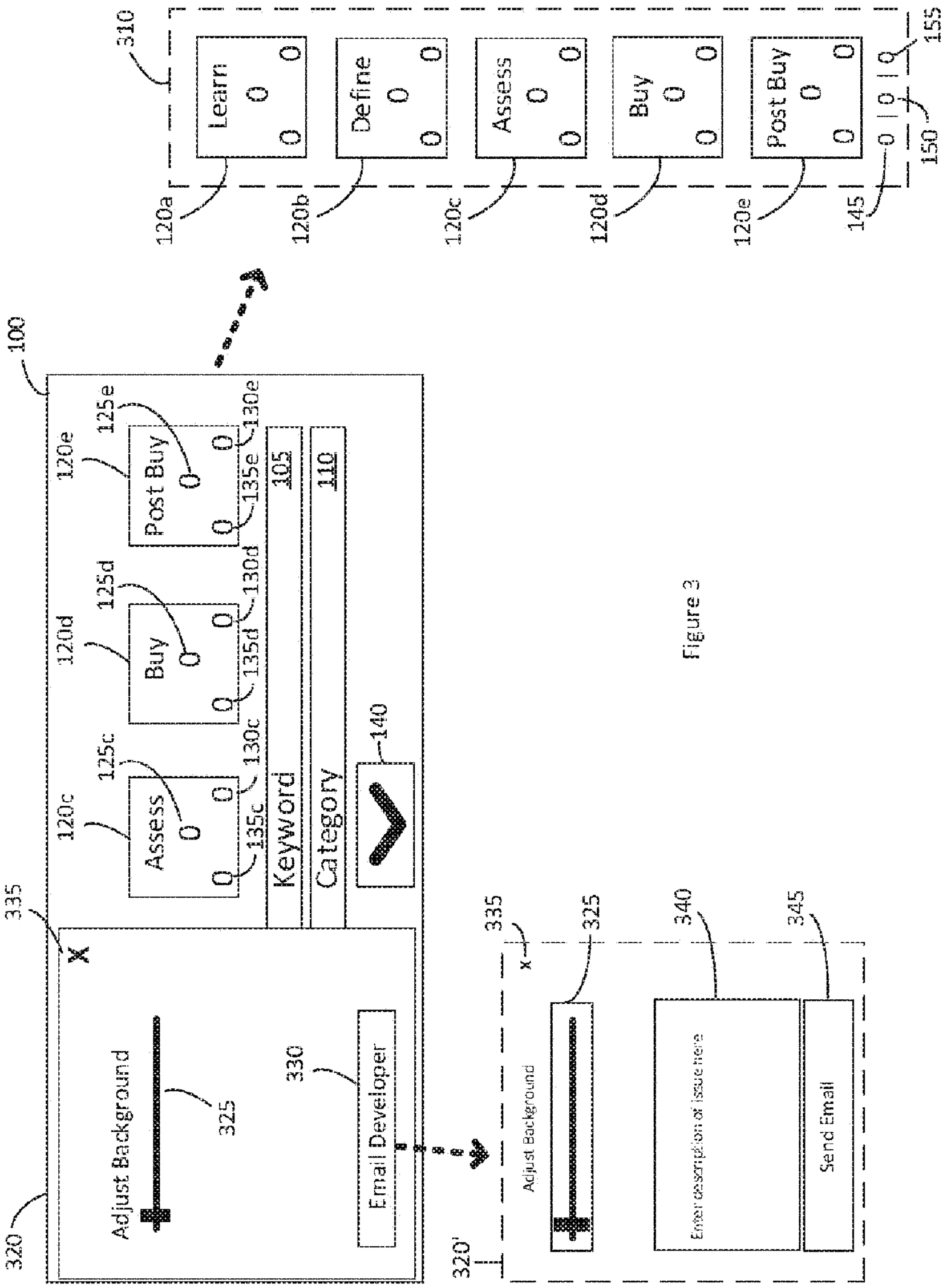

100
310
120a
120b
120c
120d
120e
Learn
Define
Assess
Buy
Post Buy
125c
125d
125e
130c
130d
130e
135c
135d
135e
105
110
Keyword
Category
140
145
150
155
335
X
Adjust Background
325
330
Email Developer
320
320'
Adjust Background
Enter description of issue here
Send Email
340
345

Figure 3

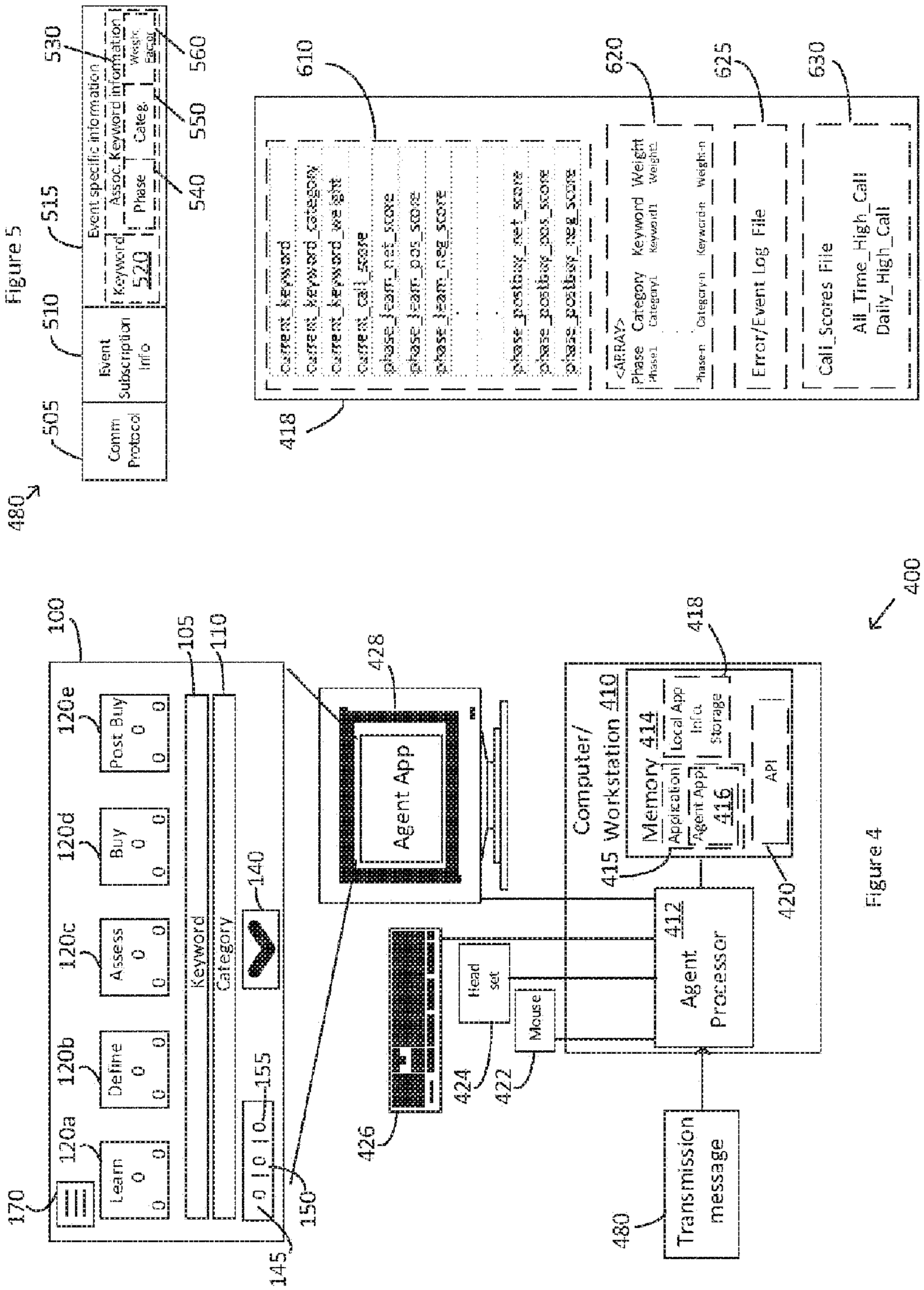


Figure 5
510
515
530
560
550
540
Event specific information
Keyword
Assoc. Keyword information
Phase
Categ.
Event Subscription Info
Comm Protocol
505
610
620
625
630
418
480
Figure 6
Figure 4
400
100
105
110
120a
120b
120c
120d
120e
Learn
Define
Assess
Buy
Post Buy
Keyword
Category
140
145
150
155
170
428
Agent App
Computer/
415 Workstation 410
Memory 414
Application
Agent App
416
Local App Info. storage
API
418
420
412
Agent Processor
Head set
Mouse
424
422
426
Transmission message

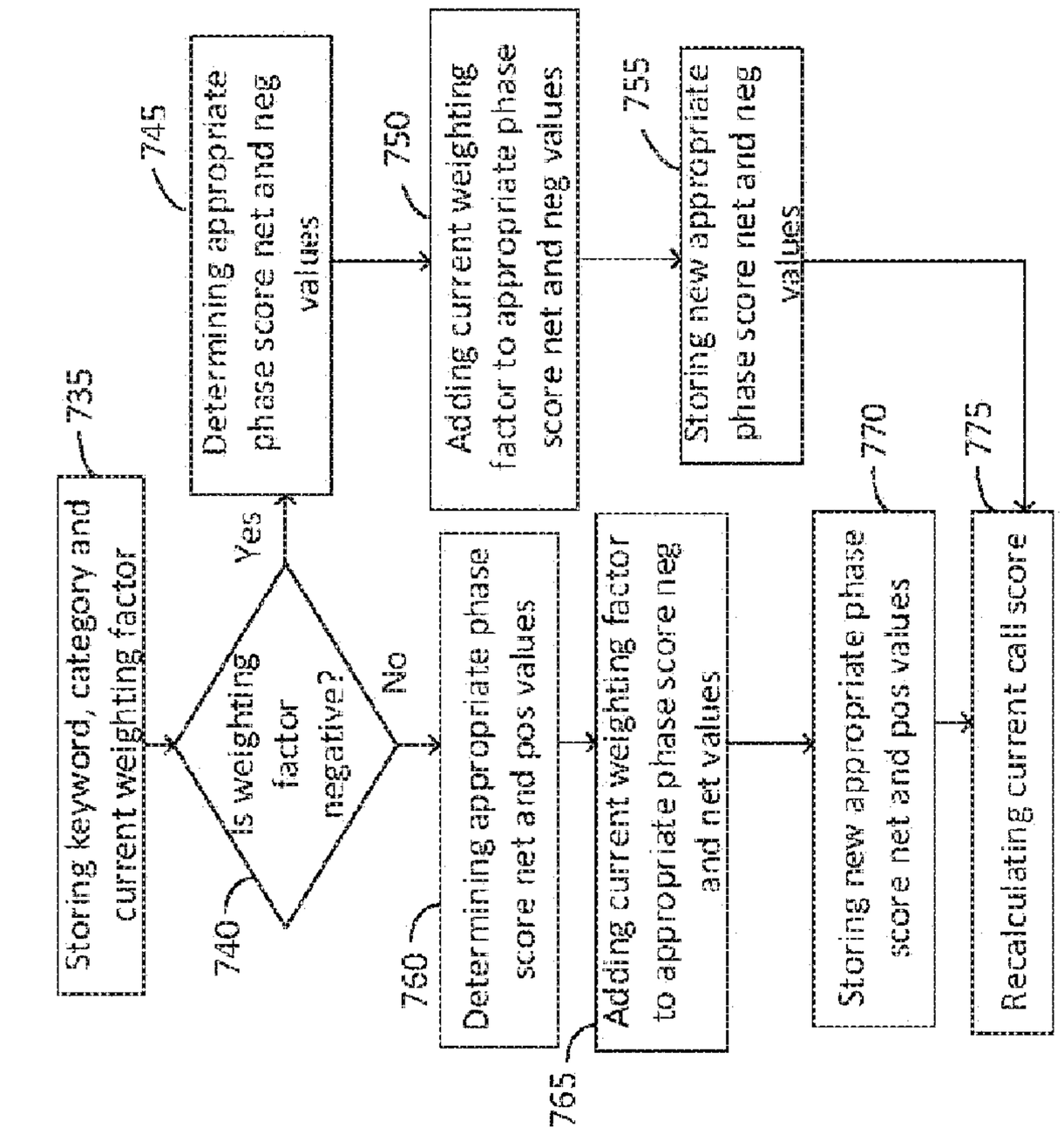


Figure 7B

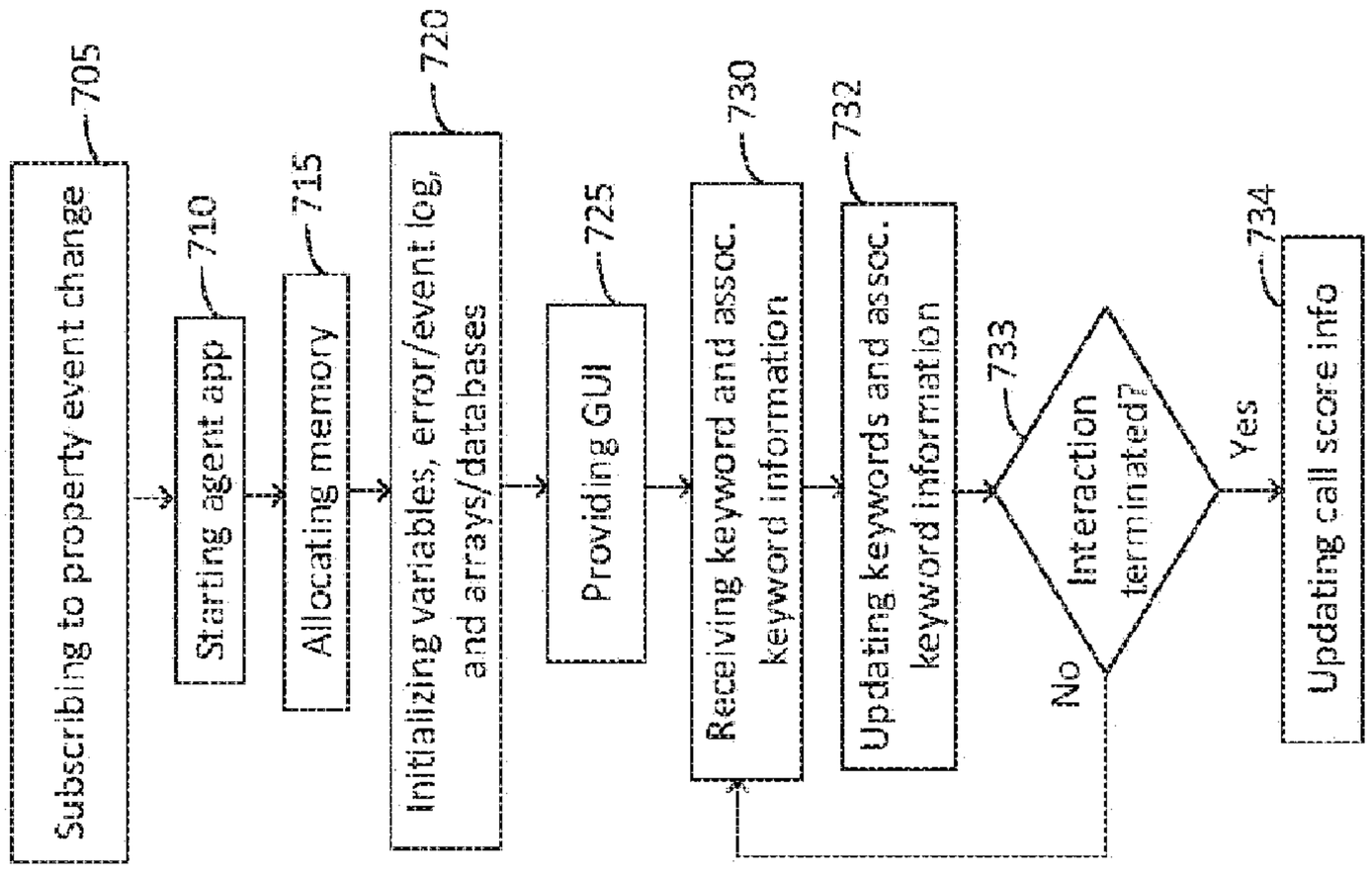


Figure 7A

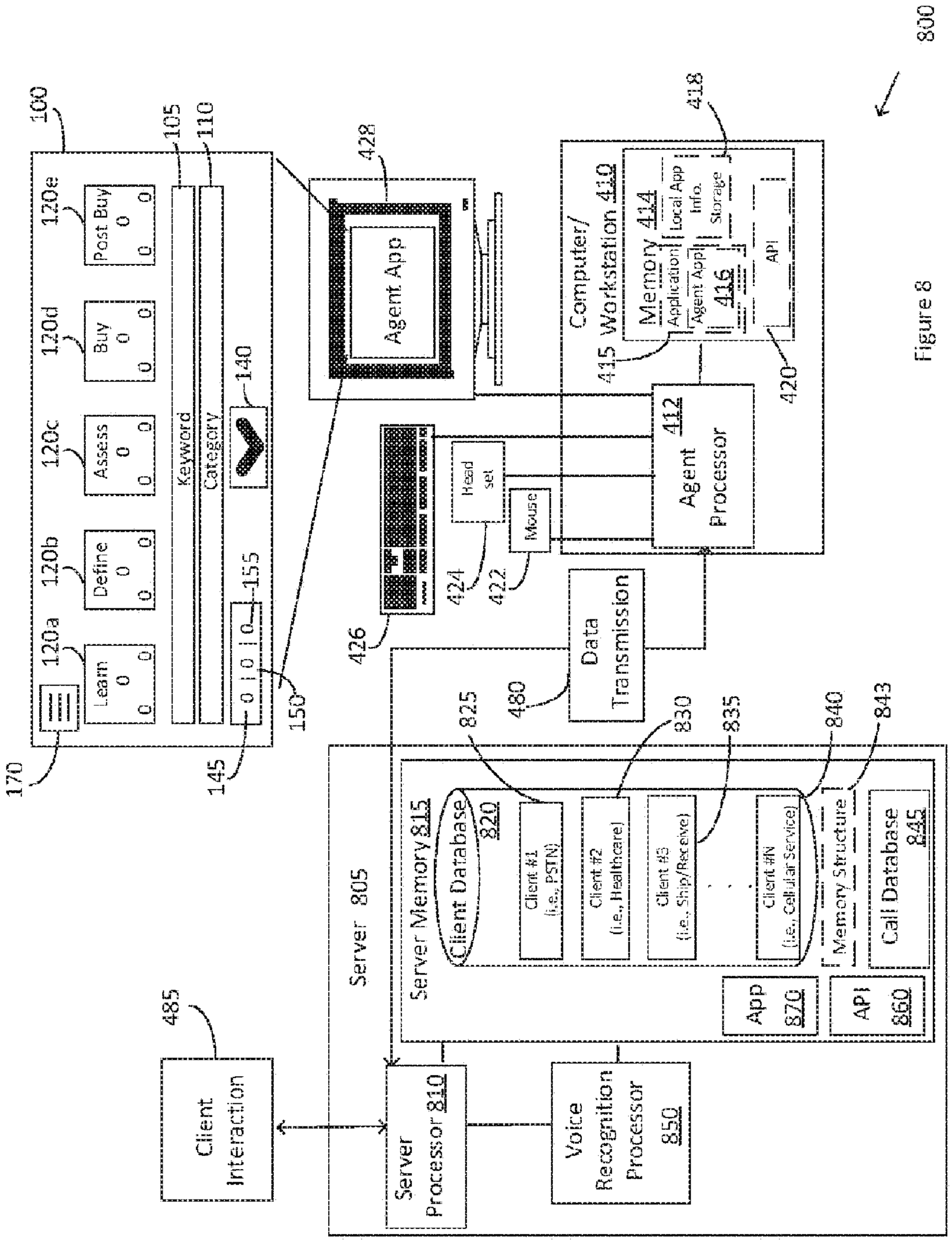

800
100
105
110
428
418
120a
120b
120c
120d
120e
Learn
Define
Assess
Buy
Post Buy
Keyword
Category
140
155
150
145
170
Agent App
Computer/
Workstation 410
Memory 414
Application
Agent Appl
Local App
Info.
Storage
416
API
415
420
412
Agent
Processor
Head
set
Mouse
424
422
426
Data
Transmission
480
485
Client
Interaction
Server 805
Server Memory 815
Client Database
820
825
Client #1
(i.e., PSTN)
Client #2
(i.e., Healthcare)
Client #5
(i.e., Ship/Receive)
Client #N
(i.e., Cellular Service)
830
835
840
843
Memory Structure
Call Database
845
App
870
API
860
Server
Processor 810
Voice
Recognition
Processor
850

Figure 8

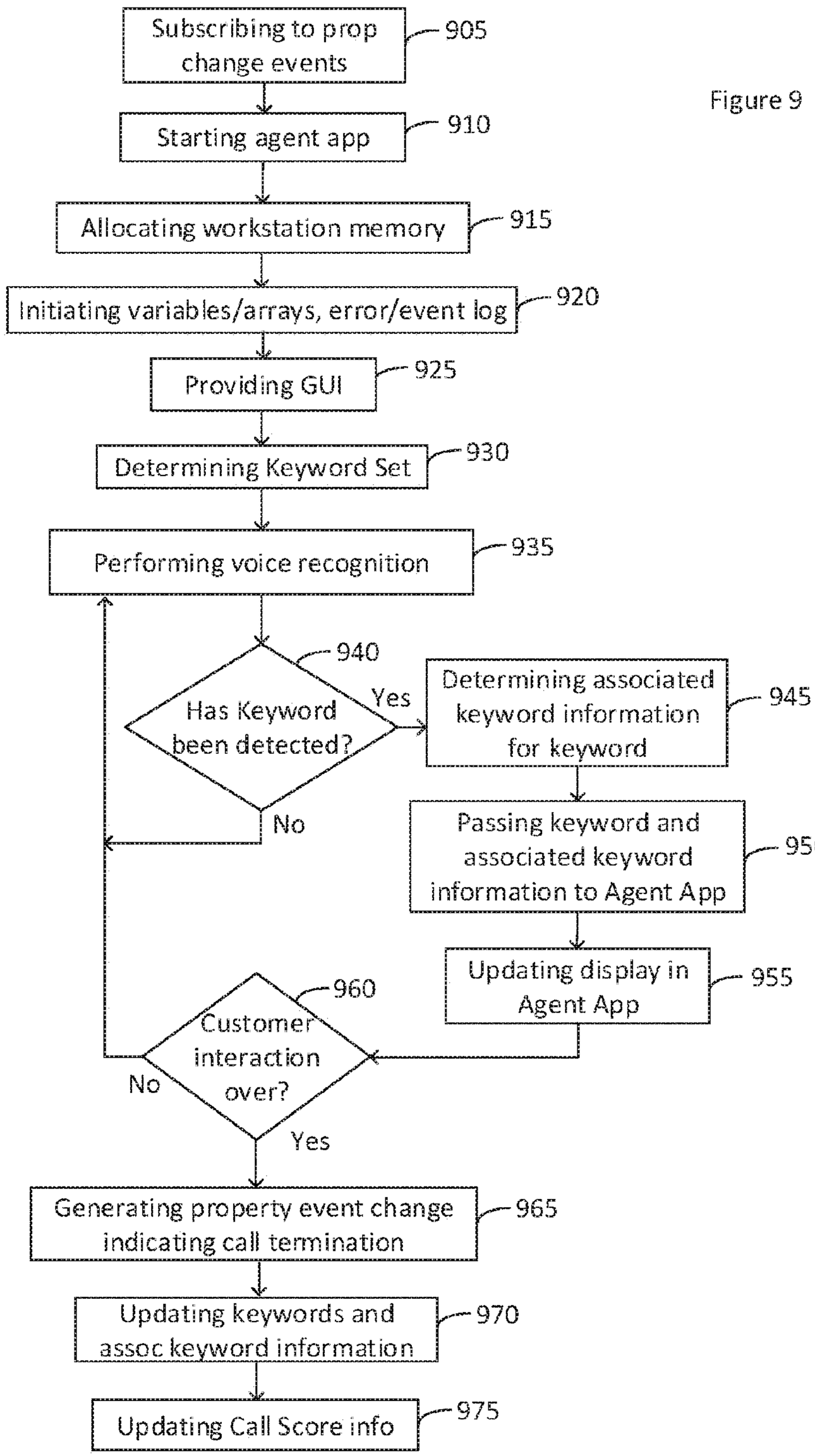
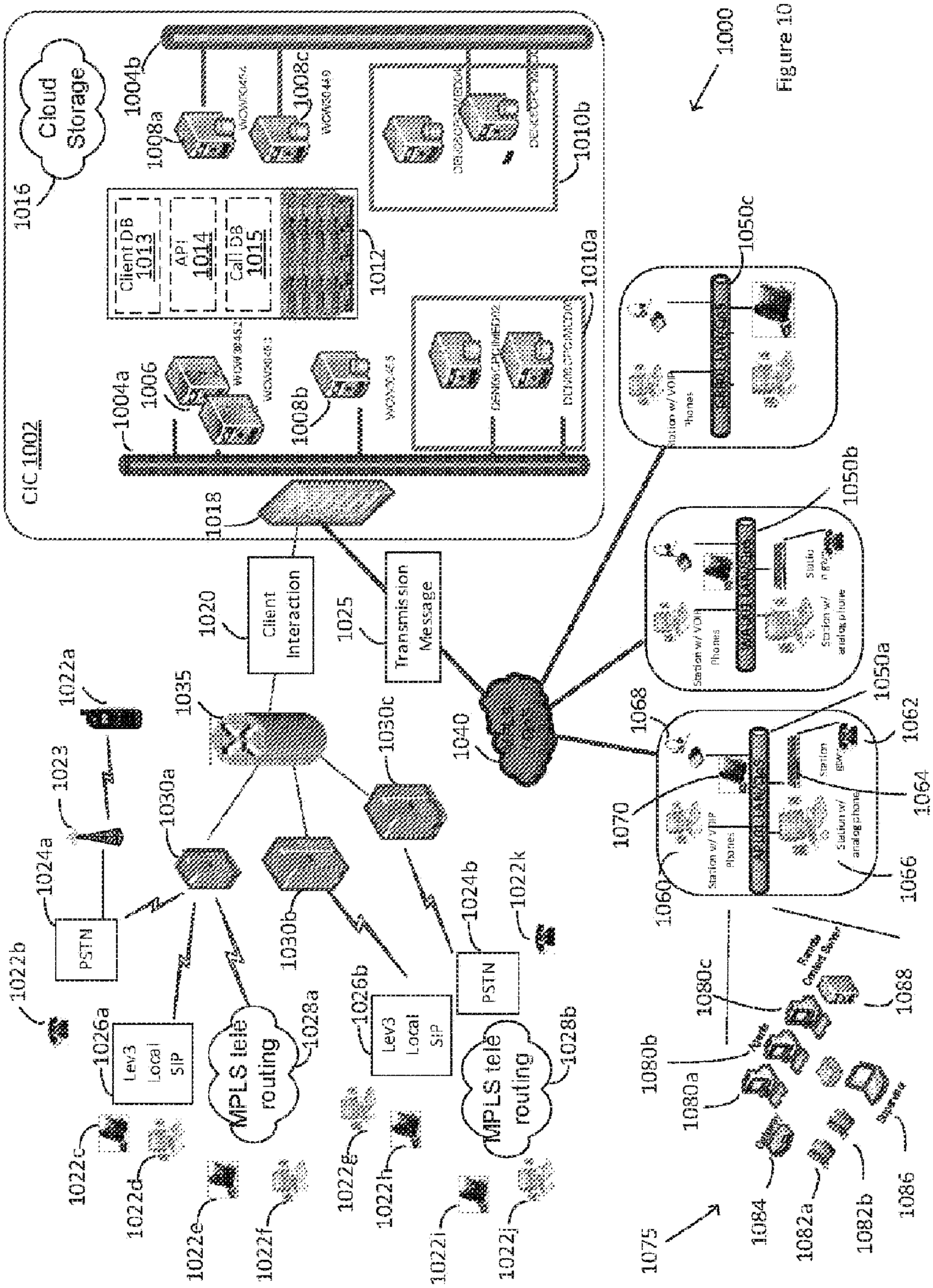

Subscribing to prop change events
905
Starting agent app
910
Allocating workstation memory
915
Initiating variables/arrays, error/event log
920
Providing GUI
925
Determining Keyword Set
930
Performing voice recognition
935
940
Has Keyword been detected?
Yes
No
Determining associated keyword information for keyword
945
Passing keyword and associated keyword information to Agent App
950
Updating display in Agent App
955
960
Customer interaction over?
No
Yes
Generating property event change indicating call termination
965
Updating keywords and assoc keyword information
970
Updating Call Score info
975

Figure 9

Figure 10


1000
1016
Cloud Storage
1004b
1008a
1008c
1010b
Client DB 1013
API 1014
Call DB 1015
1012
1010a
1004a
1006
1008b
CIC 1002
1018
1020
Client Interaction
1025
Transmission Message
1035
1040
1022a
1023
1024a
PSTN
1030a
1030b
1030c
1024b
1022k
1022b
1026a
Lev3 Local SIP
1026b
1028a
1028b
MPLS tele routing
1022c
1022d
1022e
1022f
1022g
1022h
1022i
1022j
1050c
1050b
1050a
1068
1062
1064
1070
1060
1066
Station w/ VOIP Phones
Station w/ analog phone
1080c
1080b
1080a
1075
1084
1082a
1082b
1086
1088

1100

1125	Keyword Phase (1105)	Keyword Category (1110)	Keyword /phrase (1115)	Keyword Score (1120)
	Learn	Introduction	calling on behalf of Company A	1
	Learn	Engage Customer	on a recorded line	1
	Learn	Engage Customer	provide you with any assistance	1
	.			
	.			
	Define	Determine the Customer's Needs	do you have any questions about	2
	Define	Determine the Customer's Needs	just checking in	-2
	.			
	.			
	Assess	Develop appropriate solutions	<Feature 1>	3
	Assess	Demonstrate Brand Value	<Advantage x>	3
	.			
	.			
	Buy	Initiate Customer Solutions	thank you for your order	4
	.			
	.			
	Post Buy	<Category X>	thank you for choosing	5

1135

1140

Figure 11

	1301 Keyword Phase	1303 Keyword Category	1305 Keyword /phrase	1307 Keyword Score	1309 Date/Time
1310 →	Learn	Introduction	calling on behalf of Company A	1	20180312 13:42:05.003
1320 →	Learn	Engage Customer	on a recorded line	1	20180312 13:42:25.867
1330 →	Define	Determine the Customer's Needs	do you have any questions about	2	20180312 13:43:08.142
1340 →	Learn	Engage Customer	provide you with any assistance	1	20180312 13:43:45.622
1350 →	Define	Determine the Customer's Needs	just checking in	-2	20180312 13:45:51.438
1360 →	Assess	Develop appropriate solutions	<Feature 4>	3	20180312 13:48:15.776
1370 →	Assess	Demonstrate Brand Value	<Advantage x>	3	20180312 13:50:37.256
1380 →	Buy	Initiate Customer Solutions	thank you for your order	4	20180312 13:54:21.943
1390 →	Post Buy	<Category x>	thank you for choosing	5	20180312 13:56:30.323

Figure 13

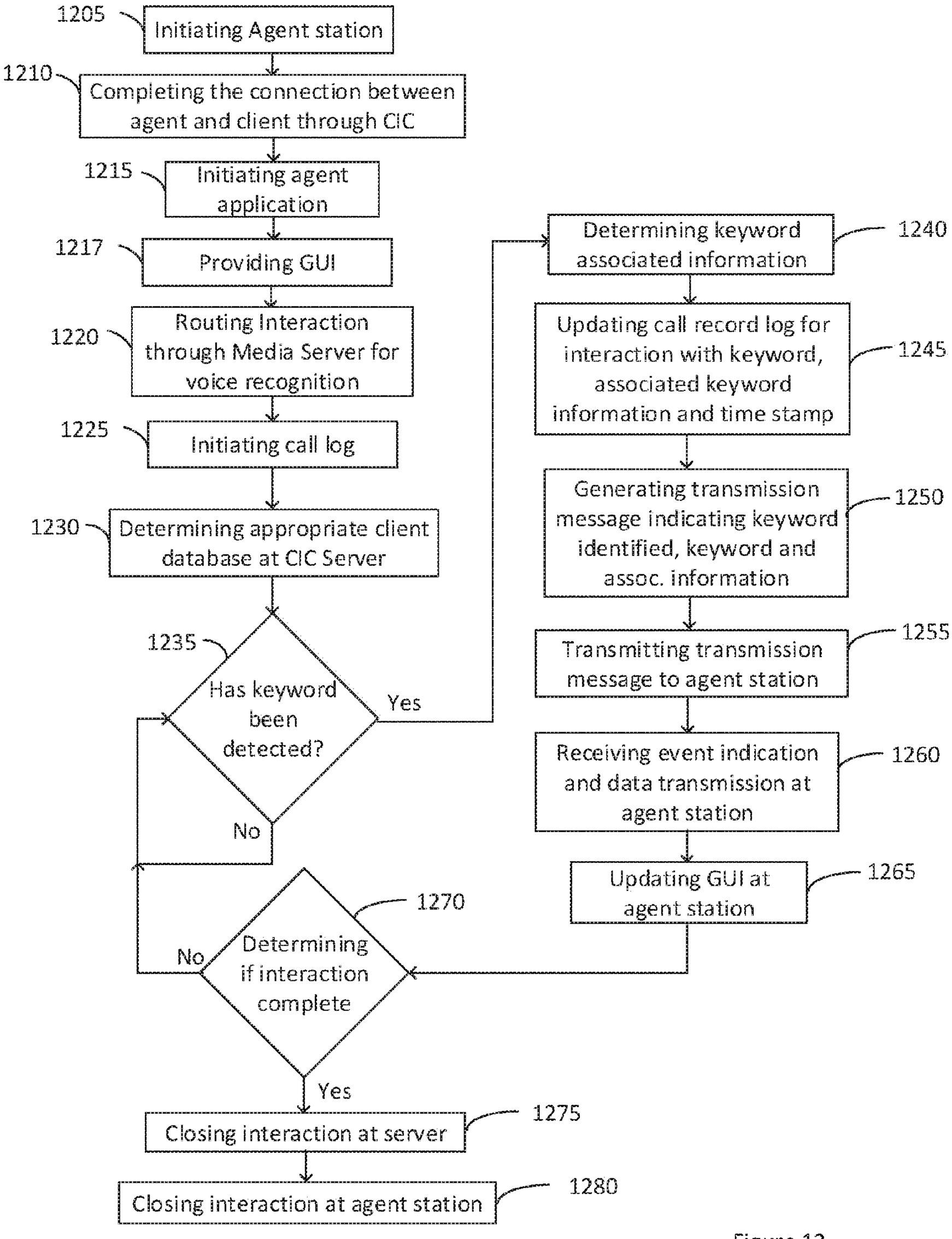

1205
Initiating Agent station
1210
Completing the connection between agent and client through CIC
1215
Initiating agent application
1217
Providing GUI
1220
Routing Interaction through Media Server for voice recognition
1225
Initiating call log
1230
Determining appropriate client database at CIC Server
1235
Has keyword been detected?
Yes
No
1240
Determining keyword associated information
1245
Updating call record log for interaction with keyword, associated keyword information and time stamp
1250
Generating transmission message indicating keyword identified, keyword and assoc. information
1255
Transmitting transmission message to agent station
1260
Receiving event indication and data transmission at agent station
1265
Updating GUI at agent station
1270
Determining if interaction complete
No
Yes
1275
Closing interaction at server
1280
Closing interaction at agent station

Figure 12

	1402 Keyword Phase	1404 Keyword Category	1406 Keyword /phrase	1408 Keyword Score
1410 →	Learn	Introduction	calling on behalf of Company A	1
1420 →	Learn	Engage Customer	on a recorded line	1
1430 →	Define	Determine the Customer's Needs	do you have any questions about	2
1440 →	Learn	Engage Customer	provide you with any assistance	1
1450 →	Define	Determine the Customer's Needs	just checking in	-2
1460 →	Assess	Develop appropriate solutions	<Feature 4>	3
1470 →	Assess	Demonstrate Brand Value	<Advantage x>	3
1480 →	Buy	Initiate Customer Solutions	thank you for your order	4
1490 →	Post Buy	<Category X>	thank you for choosing	5

Figure 14

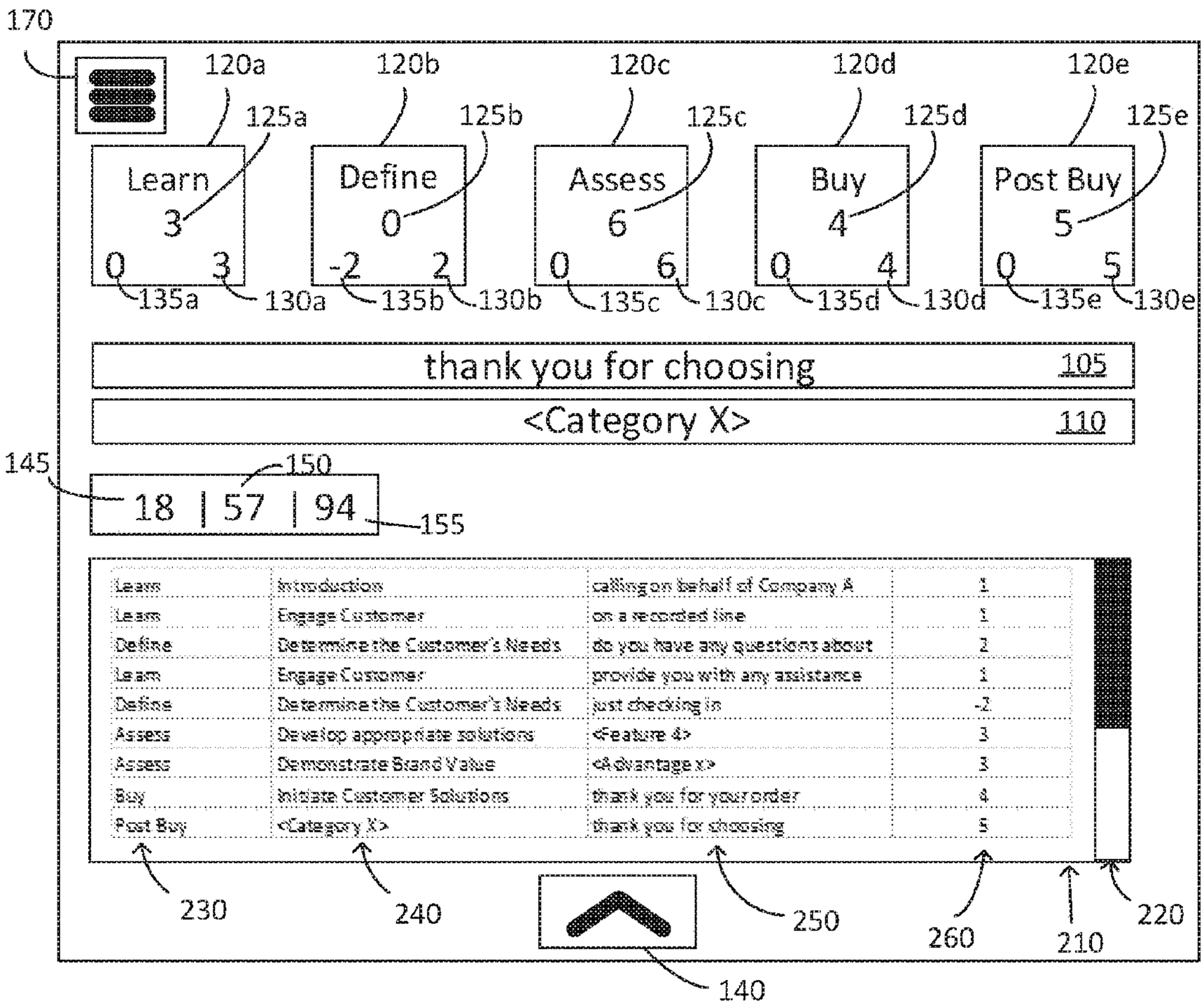


Figure 16

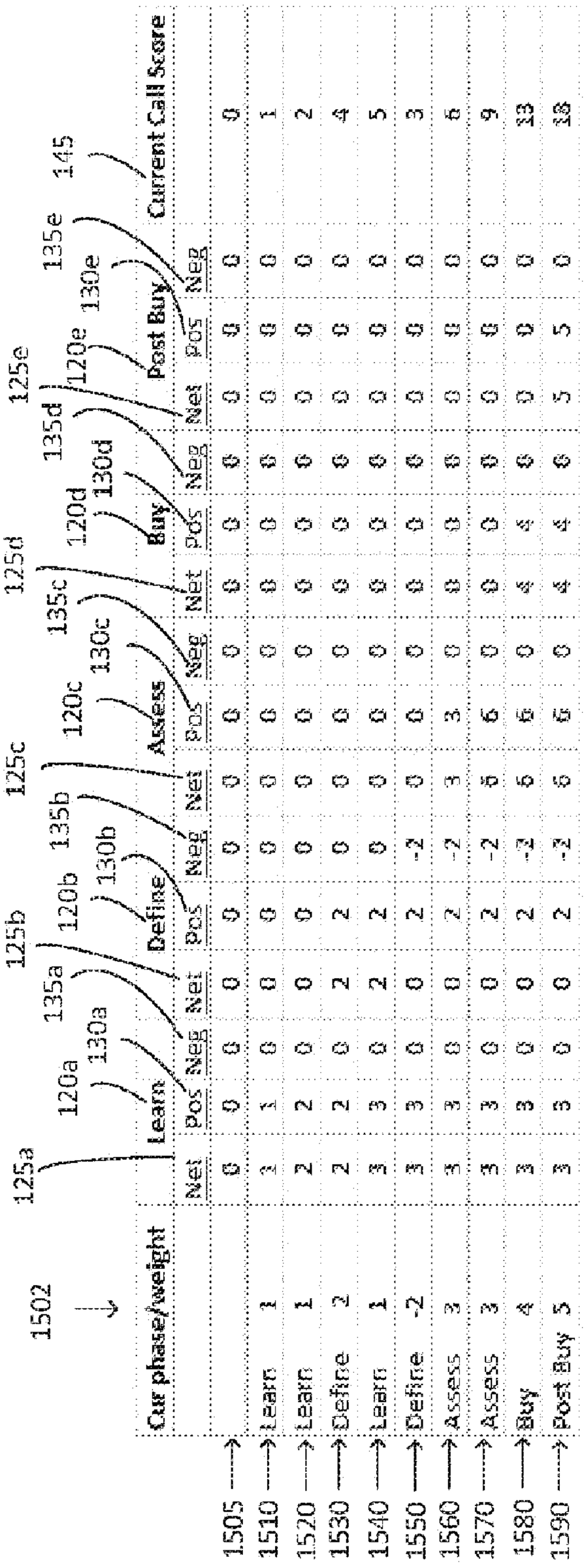

1502
1505
1510
1520
1530
1540
1550
1560
1570
1580
1590
Cur phase/weight
Net
Current Call Score
Learn
Define
Assess
Buy
Post Buy
Pos
Neg
Net
120a
130a
135a
125a
120b
130b
135b
125b
120c
130c
135c
125c
120d
130d
135d
125d
120e
130e
135e
125e
145

Figure 15

SYSTEM AND METHOD FOR ASSISTING AN AGENT DURING A CLIENT INTERACTION

TECHNICAL FIELD

This disclosure is directed to customer interactions, and more particularly, to providing a system, method and application that assists an agent during a client interaction.

BACKGROUND ART

Companies utilize agents in interactions with clients, for example, to provide customer support or assist in sales. Such agents often interact with clients/customers using a voice channel, for example, a telephone landline or a voice over IP (VoIP) channel, or a mobile telephone.

Companies typically provide agents with a script or guidance sheet to use during client communications, to assist the agent in answering questions, or to guide in addressing various topics to be discussed during the communication. For example, an agent may utilize a guidance sheet that provides information as to topics to address while on a call with the client. However, it becomes difficult for an agent to make a determination as to which topics have already been addressed, and to what degree, especially where the call jumps around, for example, by a client asking questions or seeking information that is in a topic not yet discussed.

This application is directed to overcoming one or more of the problems discussed above.

SUMMARY OF THE APPLICATION

In one example embodiment, provided is a computing system for assisting an agent during a client interaction between the agent and a client over a communications channel. The computing system includes an agent station having an agent processor configured to perform one or more of generate a graphic user interface of the client interaction on an agent display during the client interaction, the graphic user interface to display a current identified keyword and one or more interaction phases, each interaction phase having a respective current phase score for the client interaction. The agent processor is further configured to perform one or more of receive a keyword and associated keyword information from the client interaction, the associated keyword information including an associated interaction phase and corresponding current phase score. The agent processor is further configured to perform one or more of update the current identified keyword of the graphic user interface with the received keyword, and the current phase score of the graphic user interface that corresponds to the received associated interaction phase with the received corresponding current phase score, during the client interaction.

In another example embodiment, a method of assisting an agent during a client interaction over a communications channel, comprises one or more of providing a GUI of the client interaction on an agent display during the client interaction, the GUI displaying a current identified keyword and one or more interaction phases, each interaction phase having a respective current phase score for the client interaction. An agent station performs one or more of receiving at an agent station a keyword and associated keyword information, the associated keyword information including an associated interaction phase and associated current phase score. The agent station performs one or more of updating the current identified keyword of the graphic user interface with the received keyword, and the current phase score of the graphic user interface that corresponds to the received associated interaction phase with the received corresponding current phase score, during the client interaction.

In yet another example embodiment, a non-transitory computer readable medium having stored therein program instructions that when executed cause a computer to perform one or more of providing a GUI of the client interaction on an agent display during the client interaction, the GUI displaying a current identified keyword and one or more interaction phases, each interaction phase having a respective current phase score for the client interaction. The computer performs one or more of receiving a keyword and associated keyword information, the associated keyword information including an associated interaction phase and associated current phase score. The computer performs one or more of updating the current identified keyword of the graphic user interface with the received keyword, and the current phase score of the graphic user interface that corresponds to the received associated interaction phase with the received corresponding current phase score, during the client interaction.

Other features and modifications may be apparent from the following description when taken in conjunction with the drawings and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a proper understanding of the examples described herein, reference should be made to the enclosed figures. It should be appreciated that the figures depict only some embodiments and are not limiting of the scope of the present disclosure.

FIG. **1** illustrates an exemplary graphic user interface (GUI) **100** that may be used to assist and agent during a client interaction, in accordance with an embodiment of the application;

FIG. **2** illustrates the alteration of the GUI **100** of FIG. **1**, upon selection of the keyword expansion button **140**, in accordance with an embodiment of the application;

FIG. **3** illustrates the GUI **100** of FIG. **1**, upon detection of a right-click within the GUI **100**, or selection of the menu button **170**, in accordance with an embodiment of the application;

FIG. **4** is a computer system that may be utilized in assisting an agent during a client interaction, in accordance with an embodiment of the application;

FIG. **5** shows an exemplary transmission message that may be utilized to provide information to the agent station when assisting an agent during a client interaction, in accordance with an embodiment of the application;

FIG. **6** illustrates an exemplary structure and format for the information storage **418** of FIG. **4**, in accordance with embodiments of the application;

FIG. **7**A is a flowchart illustrating the operation of the system of FIG. **4**, in accordance with an embodiment of the application;

FIG. **7**B is a flowchart illustrating the determining of phase scoring, in accordance with an embodiment of the application;

FIG. **8** illustrates a system for assisting an agent during a client interaction, in accordance with an embodiment of the application;

FIG. **9** is a flowchart illustrating operation of the computer system of FIG. **8**, in accordance with an embodiment of the application;

FIG. **10** illustrates a computer system for assisting an agent during a client interaction, in accordance with an embodiment of the application;

FIG. **11** illustrates a client keyword database that may be utilized in assisting an agent during a client interaction, in accordance with an embodiment of the application;

FIG. **12** is a flowchart illustrating the operation of the system of FIG. **10** in assisting an agent during a client interaction, in accordance with an embodiment of the application;

FIG. **13** illustrates a representative call log file that may be generated as the keywords of the client keyword database file of FIG. **11** are identified, in accordance with an embodiment of the application;

FIG. **14** illustrates a representative array that may be generated, as the keywords of the client keyword database of FIG. **11** are identified, in accordance with an embodiment of the application;

FIG. **15** illustrates an exemplary score state table showing the progression of scores as the keywords of the client keyword database of FIG. **11** are identified, in accordance with an embodiment of the application; and

FIG. **16** provides an exemplary GUI that may be provided resulting from the keywords of the client keyword database of Figure being identified, in accordance with an embodiment of the application.

DETAILED DESCRIPTION

It will be readily understood that the components of the present application, as generally described and illustrated in the figures herein, may be arranged and designed in a wide variety of different configurations. Thus, the following detailed description of the embodiments of at least one of a method, apparatus, non-transitory computer readable medium and system, as represented in the attached figures, is not intended to limit the scope of the application as claimed, but is merely representative of the selected embodiments.

The features, structures, or characteristics as described throughout this specification may be combined in any suitable manner throughout the embodiment, In addition, the usage of phrases such as "example embodiments", "some embodiments", or other similar language, throughout this specification is used to indicate that a particular feature, structure, or characteristic described in connection with the embodiment may be included in the at least one embodiment and is not to be construed as being omitted from other embodiments. Thus, appearances of the phrase "example embodiments", "in some embodiments", "in other embodiments", or similar language, may be used to refer to the same group of embodiments, and other described features, structures, or characteristics may be combined in any suitable manner in one or more embodiments.

In addition, while the term "message" may be used in description of embodiments, the application may be applied to many types of network data, such as, packet, frame, datagram, etc. The term "message" or "request" may include packet, frame, datagram, or any equivalents thereof. Furthermore, while certain types of messages and signaling requests may be depicted in example embodiments, they are not limited to a certain type of message, and the application is not limited to a certain type of signaling.

A system, method and non-transitory computer readable memory are provided for assisting an agent during a client interaction. A graphic user interface (GUI) may be provided. Information may be received during a client interaction, including a keyword and keyword associated information including a phase and weighting factor corresponding to the keyword. The graphic user interface may be updated with the keyword and keyword associated information, thereby assisting the agent during the client interaction.

Having the keyword and associated key associated information including associated phase and weighting factor, allows an agent application to provide metrics such as phase scores, and current keyword and category, to be displayed for an agent through a single and intuitive GUI. The agent can readily assess call phases and respective phase scores, and keywords and associated keyword information utilized during the interaction, substantially in real time, as the interaction progresses. Thus, the agent is able to determine which phases and topics of an interaction have been adequately addressed, through the keyword and associated information displayed, as well through the scores provided for each phase of the interaction. Where a client asks a question or otherwise directs the interaction to topics not currently being addressed, the agent may quickly and readily reascertain the appropriate phase of the interaction and/or topics to explore after responding to the client's question or concern.

FIG. **1** illustrates an exemplary GUI **100** that may be used to assist and agent during a client interaction, in accordance with an embodiment of the application. The GUI **100** may be provided, for example, by an agent application running on an agent workstation, as will be discussed below beginning with FIG. **4**.

As shown in FIG. **1**, the current identified keyword portion **105** may display a current keyword of a client interaction (i.e., a voice call), and a current keyword category portion **110** may be utilized to display a category associated with the current keyword. A keyword as used herein may be a single word, or instead may be multiple words used together that form a phrase. GUI **100** further includes interaction phase portions **120***a*-**120***e* that may be used to display information for interaction phases of a client interaction. Interaction phases may be various stages that a customer interaction goes through in addressing the client's needs. For example, interaction phase portion **120***a* may provide information for a 'Learn' phase defining the portion of an interaction where the agent introduces him/her self and engages the client. An interaction phase **120***b* is shown, for example, for a 'Define' portion, where the agent may determine the client's needs for that interaction. Interaction phase **120***c* is shown for an 'Assess' interaction phase, where the agent may develop appropriate solutions for the client. An interaction phase portion **120***d* for a 'Buy' interaction phase may show information for the agent with regards to sales of a particular product or service to the client, and an interaction phase **120***e* for a 'Post Buy' portion is shown providing information about events or issues arising after the client purchases a product or service.

Interaction phase portions **120***a*-**120***e* each include respective current phase scores **125***a*-**125***e* that provide a current score for the respective interaction phase. The interaction phase portions **120***a*-**120***e* further include respective total positive phase scores **130***a*-**130***e*, and respective total negative scores **135***a*-**135***e*. Determination of the current phase scores **125***a*-**125***e*, total positive phase scores **130***a*-**130***e*, and total negative phase scores **135***a*-**135***e* will be discussed in detail below beginning at FIG. **7**B. Briefly, the positive score values **130***a*-**130***e* for a phase provides an indication of how many positive keywords or phrases that were identified for that particular call phase, that the agent is encouraged to use during that phase. The negative score

values **135***a*-**135***e* of a phase provides an indication to the agent how many keywords or phrases were identified that the agent is discouraged to use during that particular phase of the interaction. The current phase scores **125***a*-**125***e* of a phase is a sum of the positive keyword score less the negative keyword score for the particular phase.

The GUI **100** further includes a keyword expansion button **140** that when selected, displays a keyword list portion, for example, all keywords and associated keyword information like the keyword phase, category, and respective score, that have been used in the current client interaction. The keyword list portion will be discussed below with respect to the GUI of FIG. **2**. Further shown in the GUI **100** is a current call score **145** for displaying the current score of the current client interaction, a daily high score **150** for displaying the score for the client interaction with the highest score that day, and an all-time high score **155** for displaying the score for the client interaction with the all-time high score since the agent application providing the GUI **100** was first used. A menu button **170** provides agent application options to an agent when selected. In addition, a right-click within the GUI **100** will cause a mini-mode, or compact display mode, to be displayed. The menu and the compact display mode will be discussed below with respect to FIG. **3**.

FIG. **2** illustrates the alteration of the GUI **100**, upon selection of the keyword expansion button **140**, in accordance with an embodiment of the application. Elements of FIG. **2** having reference numerals that have been previously used may operate in a similar fashion and will not be discussed in detail.

Upon selection of the keyword expansion button **140**, a keyword list portion **210** is displayed in the GUI **100**. If the keyword list portion **210** is longer than what will display within the list portion area of the GUI, a scroll bar **220** may be utilized to scroll through the keyword list portion **210**.

The keyword list portion **210** may display keywords used during a current client interaction, as well associated keyword information such as one or more of an associated phase, category and weighting factor (i.e., shown as the score) for the keyword. As shown in the keyword list portion **210**, a phase column **230**, category column **240** and weighting factor (score) column **260** provides respective call phase, category and score information for a respective keyword or phrase of the keyword column **250** that have been utilized during a client interaction. As shown, the selection of the keyword list button **140** will collapse the keyword list **210** back to the GUI **100** shown in FIG. **1**.

FIG. **3** illustrates the GUI **100** of FIG. **1**, upon detection of a right-click within the GUI **100**, or selection of the menu button **170**, in accordance with embodiments of the application. Elements of FIG. **3** having reference numbers previously discussed may operate in a similar fashion and will not be discussed in detail.

When a mouse right-click is detected within the GUI **100**, the GUI **100** may be replaced by a compact mode GUI **310**. The compact mode GUI **310** may include the interaction phase information portions **120***a*-**120***e* that provide respective current score information for the various call phases, as described above with respect to FIG. **1**. Further, the compact mode GUI **310** may include the current call score **145**, a high score **150** and an all time high score **155**, as described above with respect to FIG. **1**. To exit the compact mode display, a user may right-click anywhere within the compact mode display **310**, thereby replacing the compact mode GUI **310** with the GUI **100**.

Upon selection of the menu button **170**, an expanded menu **320** is provided. The expanded menu **320** may be superimposed over the GUI **100**, as shown in FIG. **3**. Instead, the expanded menu **320** may be displayed adjacent to the GUI **100**.

The expanded menu **320** may include a background color slider **325**, allowing background colors to be adjusted for the GUI, for example, altering the intensity and/or brightness of the GUI. Further, an email developer button **330** may be provided, allowing an agent using the agent application providing the GUI **100** to enter a description of an issue that is desired to be addressed. Further, an exit menu button icon **335** may be provided, where selection of the exit menu icon closes the expanded menu, returning the display back to the state as shown in FIG. **1**, where the menu button **170** is displayed.

Upon selection of the e-mail developer button **330**, the expanded menu **320** is altered to an expanded e-mail display **320'** providing an e-mail dialog box **340**, where the agent may enter the description of the issue that needs addressing. A send email button **345** may be provided, that when selected, sends the dialog entered into the dialog box **340** to the developer (or some other party with an interest to the issue addressed in the e-mail dialog box) as an e-mail message. The e-mail message may be addressed, for example, from the particular agent station running the agent application that provides the GUI **100**. The email may include (i.e., as an appended file) a screen shot of the GUI **100** at the time the e-mail is sent (i.e., the screenshot provided as if the expanded menu **320** were not being displayed). The e-mail may further include (i.e., as an appended file) an error/event log file, including errors generated by the application, as well as events occurring while the application is running (i.e., indicating application start, telephony log in, keyword utterance events with associated keyword information, telephony log out, application close, etc. . . .). Thus, it will be appreciated that the agent application is capable of detecting at least certain errors during its operation, and maintaining information regarding events that occur while the application is running. Upon sending the e-mail by selection of the send email button **345**, the expanded e-mail menu **320'** dialog interaction box **340** collapses, returning the GUI **100** to the displaying the expanded menu **320**. Though the expanded e-mail display **320'** is shown adjacent the other portions of the GUI **100** for simplicity purposes, typically, the expanded e-mail display **320'** would replace the expanded menu **320** upon selection of the e-mail developer button **330**.

The GUI **100** described with respect to FIGS. **1-3** may include color-coding. For example, each interaction phase **120***a*-**120***e* may have a heading that is provided a specific color, for easy identification for the agent. The keyword list **210** may be coordinated to the specific phase colors. For example, referring to FIG. **2**, rows of the keyword list may be color-coded for the color of the phase of the phase column **230**. Further, where the current identified keyword displayed at keyword **105** is associated with a positive-valued weighting factor, the keyword displayed at **105** and associated category **110** may be color-coded in green. Where the current identified keyword displayed at keyword **105** is associated with a negative-valued associated weighting factor, the keyword displayed at **105** and associated category **110** may be color-coded in red.

FIG. **4** is a computer system that may be utilized in assisting an agent during a client interaction, in accordance with an embodiment of the application. Elements of FIG. **4**

having reference numerals already discussed may operate in a similar fashion and will not be discussed in detail.

As shown in FIG. **4**, an agent workstation **410** may include an agent processor **412** coupled with a memory **414**. The memory **414** may include an application portion **415** for storing applications, programs, etc. . . . used at the agent station, including the agent application **416**. The agent application **416** is able to receive information about a client interaction, process the information, and generate/update on a display **428** the GUI **100** that may assist the agent during the client interaction. The memory **414** may further include a local app information storage portion **418** that may be utilized to store information for applications running at the agent workstation **410**, for example, the agent application **416**, and an application interface (API) portion **420**. The API portion **420** may include, for example, software libraries, instructional code, or other files utilized by the agent processor **412** in processing information received at the agent station **410** about a client interaction, and allowing the processor to provide that information to applications running on the application portion **415**, including the agent application **416** providing the GUI **100**.

The agent workstation **410** may be coupled with input devices, allowing information to be entered for the agent workstation **410**. For example, a mouse **422**, headset **424** and/or keyboard **426** may be provided. Further, the display **428** may be provided, thereby allowing the agent workstation **410** to display applications operating thereon, including the agent application **416** providing the GUI **100**.

As shown, a transmission message **480** may provide information about a client interaction that may be processed by the agent application **416** in providing the GUI **100**. The processor may be any processor having the capabilities of running the agent application **416** and for utilizing the communication protocol(s) used to process the transmission message **480**. The memory **414** may be any combination of volatile and non-volatile memory, including for example, RAM, ROM, hard disk, flash drive, etc. . . . for storing the applications including the agent application **416**, providing any information storage **418** for the applications, and for providing any sufficient API **420**. Operation of the system of FIG. **4** in providing assistance to an agent during a client communication, will be discussed below beginning with the flowchart of FIG. **7**.

FIG. **5** shows an exemplary transmission message **480** that may be utilized to provide information to the agent application **416** when assisting an agent during a client interaction, in accordance with an embodiment of the application. As shown in FIG. **5**, the transmission message **480** may include some communications protocol packaging **505** (or multiple layers thereof), in a protocol and arrangement understood by the agent workstation **410**. For example, the API **420** of the workstation **410** of FIG. **4** may include as part of a software library or other files or instructional code, libraries and/or files for interpreting and parsing the information provided via the communications protocol **505** used for the transmission message **480**. The transmission message **480** may further include event subscription information **510**, providing information about an event to which the agent workstation was subscribed to that triggered the transmission message **480**. The transmission message may further include event specific information portion **515**, that provides information to the agent workstation related to the event of the event subscription information **510**. The event specific information **515**, may include, for example, a current identified keyword (or keyphrase) portion **520**, and a keyword associated information portion **530** where the event subscription information indicated a keyword was identified. The keyword associated information portion **530** may include a phase portion **540**, a category portion **550** and a weighting factor portion **560** as shown in FIG. **5**, that correspond with the keyword **520**.

Though the transmission message **480** is shown as a single packet/message, it will be appreciated that the information contained therein may be transmitted over multiple packets or messages, depending on the particular communications standards and APIs being employed at the agent workstation **410**. The event specific information **515** may be left out of a transmission if the event subscription information **510** is sufficient for the communication to the agent workstation. For example, the agent workstation **410** may be subscribed to receive an event indication when a client interaction is initiated. The reception of the transmission message **480**, in one or more messages, indicating the communications protocol **505** and the event subscription information **510** that signifies that a client interaction has begun may thus be sufficient for the transmission message **480** without the need to communicate any event specific information **515**.

FIG. **6** illustrates an exemplary structure and format for the information storage **418** of FIG. **4**, in accordance with an embodiment of the application. The structure and format of FIG. **6** illustrates the various information, such as variables, arrays, databases and/or files that may be utilized by the agent application **416** in providing the GUI **100**. As shown in FIG. **6**, a variable portion **610** may include variables for storing information such as the current keyword, current keyword category, current weighting factor, and a current call score identified during a client interaction. Variable portion **610** may further include the net score, positive score and negative score information variables for the various phases of a client interaction. The local app information storage **418** may further include an array or database portion **620** that stores keyword and associated keyword information that has been previously utilized during the client interaction. An Error/Event Log File portion **625** may store an error/event log file that logs errors and events generated by the application, for example, as a text file. The error/event log file may automatically be appended to an email sent, for example, using the Email Developer Button **330** as discussed above with respect to FIG. **3**. Further, a call scores portion **630** may be provided, for example, storing an all time call high score and a daily call high score.

The variable and array portions **610**, **620**, may be stored as a single file as individual files, and/or as blocks of allocated memory of the information storage portion **418**. The information storage portion **418** may be located in RAM, ROM, a hard disk, a flash drive or other removable storage media, or some combination thereof. The call scores file **630** may be, for example, any file(s), may be encrypted, and that provides access to all time high score information and daily high call score information for different client interactions that have occurred using the agent application **416** over a single day or multiple days.

The variable portion **610**, array/database portion **620** and error/event log file **625** may be defined and/or allocated upon each initiation of the agent application **416**. Initially, the variables of variable portion **610** and arrays and/or databases of array/database portion **620** may be initialized to zero. The variables of variable portion **610** and arrays/databases of array/database portion **620** may then be populated by the agent application **416** during a client interaction, for use in providing, updating and maintaining the GUI **100**. Further, upon initiation of a client interaction, the values for

any variables **610** and arrays/databases **620** may be zeroed out, and the error/event log **625** initialized, thereby preparing the agent application **416** for the particular client interaction. In contrast, the call scores file(s) of call scores files portion **630** may be maintained indefinitely, and used to display the all time call high score and the daily high call score across multiple client interactions.

Though the variable portion **610** and array portion **620** show specific information stored therein, such information may instead be maintained in a different fashion for the local application information storage portion **418**. For example, the phase scoring for each phase, instead of being maintained as individual variables of the variable portion **610**, may instead be maintained with an array at array portion **620**.

FIG. **7**A is a flowchart illustrating the operation of the system of FIG. **4** for assisting an agent during a client interaction, in accordance with an embodiment of the application. FIG. **7**A will be discussed with respect to the GUI **100** of FIGS. **1-3**, the system of FIG. **4** and exemplary data structures of FIGS. **5-6**. As shown at step **705**, the agent workstation subscribes to property change events. The agent workstation **410**, when powered up, may utilize the API of API **420** that allows for subscribing to events that may occur at other devices within a network to which the agent workstation **410** is in communication. Thus, an API of API **420** may cause the agent workstation **410** to subscribe to property change events related to a client interaction, including a call connected event, a keyword identified event, a call disconnected event, etc. . . . . At step **710**, the agent application is started. This may occur, for example, automatically when the agent workstation **410** is powered-up. In the alternative, an agent utilizing the workstation **410** may select the agent application **416** to run on the workstation, for example, using the mouse **422** or the keyboard **426**. The agent application may instead automatically start/open upon receipt of a client interaction, like a voice call, at the agent station.

Memory is then allocated, as shown at step **715**. This may occur, for example, with the variables of variable portion **610** and array/databases of array/database portion **620** being allocated in the memory **414**. As shown at step **720**, the variables, the error/event log, and arrays/databases are initialized. For example, the values for the variables of the variable portion **610** and the arrays/databases of array/database portion may all be set to zero, thereby preparing the agent application **716** for the new client interaction indicated by a call initiated subscription property event attribute change being received at the agent workstation. The error/event log file **625** may be initialized, preparing it for the current client interaction.

As shown at step **725**, the GUI may be provided, for example, the GUI **100**, at the display **428** of the agent station **410**. The GUI may include, for example, the current identified keyword, category, as well as one or more phases of a client interaction, where each phase may display a score for that respective phase. Further, providing the GUI at step **720** may include populating a daily high score and an all-time high call score **150**, **155** with the corresponding values from the call scores file **630**.

As shown at step **730**, a keyword and associated keyword information is received, for example, via the transmission message **480** at the agent station **410**. For example, during a client interaction, a keyword (or phrase) may be identified as having been spoken by the agent through a property event attribute change to an agent keyword identified subscription event. The property change event for a keyword spoken triggers the sending of the transmission message **480**. An attribute changed event may be executed, that provides the transmission message bundling the event specific information **515** as keyword **520** and keyword associated information **530** including phase **540**, category **550** and weighting factor **560** associated with the keyword **520**. The agent station detects the attribute property change, to the events for which it is subscribed, for example, an event attribute property change indicated within the transmission message **480**.

Keyword and associated keyword information is updated for the GUI **100** as shown at step **732**. Phase scores, for example, current, positive and/or negative phase scores, are calculated for use in updating the GUI **100**. Determination of the current, positive and negative call phase scores will be discussed below with respect to FIG. **7**B. It will be appreciated that in some embodiments, the phase score calculation may be carried out at the agent workstation. In other embodiments, the phase scores for each phase may be determined at some other device, for example, a server in communication with the agent workstation, as will be described further below with respect to FIG. **9**, where the call score information such as current, positive and negative phase score information is transmitted as variables within the event specific information **515** of the transmission message **480** in a predetermined format. In this later embodiment, the call score information like the current, positive and/or negative phase score information is received at the agent station as part of the receiving **730**.

The updating **732** may occur, for example, by taking the received keyword and associated keyword information from portions **520** and **530** of the transmission message **480**, and updating an array (or database) of array portion **620** with the keyword and associated keyword information. Thus, an agent, when expanding the keyword list expansion button **140** of the GUI **100**, may be provided the keyword list **210** as shown in FIG. **2** using the values from the array. It is then determined at step **733** whether the client interaction is terminated. This may be detected, for example, by receiving an indication in a transmission message **480** to the agent station **410** of a changed property event attribute for a subscribed call termination event, that the client interaction has ended. At this time, the call score file of the call score files portion **630** may be updated at step **734**, for example, by replacing values in one or both of the daily_high_call and all_time_high_call files with the value of the current_call_score variable of variable portion **610** for the client interaction, where the current_call_score value is greater than one or both of the daily_high_call and all_time_high_call values. In one embodiment, the call scores file may be maintained and the call scores determined at the agent workstation. In another embodiment, the call score file portion **630** may be maintained and the call scores calculated at some other device, for example, a server in communication with the agent station, as described below with respect to step **975** of FIG. **9**.

FIG. **7**B is a flowchart illustrating determining current, positive and negative phase scores, in accordance with an embodiment of the application. FIG. **7**B will be discussed with respect to the GUI **100** of FIGS. **1-3**, the system of FIG. **4** and exemplary data structures of FIGS. **5-6**. FIG. **7**B will be discussed where the current, positive and negative phase scores are being determined at the agent station. Below, with respect to FIG. **9**, FIG. **7**B will be discussed in the context of the current, positive and negative phase scores being determined at some other device, for example, a server in communication with the agent workstation. It is contem-

plated that the determining of the current, positive and negative phase scores as described below with respect to FIG. **9** may also occur for the system of FIG. **4** by some outside device, for example, a server in communication with the agent workstation.

As shown at step **735**, the keyword and keyword associated information is stored. Where the phase score is determined at the agent workstation, this may be accomplished where upon receipt of the transmission message, the agent processor **412** uses the API **420** to parse the keyword portion **520** and keyword associated information portion **530** from the transmission message **480**, accounting for an appropriate communications protocol(s) **505**. The agent processor **410** may then pass the information on to the agent application **416**. The agent application may store the keyword **520** in the current_keyword variable location of the variable portion **610**, and the category **550** in the current_keyword_category variable location of the variable portion **610**. The weighting factor value **550** may then be stored in the current_keyword_weight variable.

It may be determined at step **740** whether the weighting factor has a negative value, as shown at step **740**. Where the weighting factor value has a negative value, an appropriate phase score for the net and neg score values is determined at step **745**. For example, where the phase portion **540** indicates that the associated phase for the keyword **520** is the 'learn' phase, the appropriate phase values may be determined by retrieving the phase_learn_net_score and the phase_learn_neg_score values from the variable portion **610**. At step **750**, the current weighting factor is added to the appropriate phase score net and neg score values determined at step **745**. For example, for the 'learn' phase example mentioned above, the value of the weighting factor **550** is added to each of the phase_learn_net_score and the phase_learn_neg_score values. At step **755**, the newly calculated values for the appropriate phase net and neg scores are stored back into the variables. For example, the newly calculated values for the net and neg values calculated accounting for the weighting value associated with the learn phase are stored back into the phase_learn_net_score and the phase_learn_neg_score variables of the variable portion **620**. The current call score value is then recalculated as shown at step **775**, for example, by retrieving the current call score value from the current_call_score variable of variable portion **610**, adding the value of the weighting factor value to the current call score value, and storing the newly calculated call score value back into the current_call_score variable of variable portion **610**.

Returning to step **740**, where it is determined that the weighting factor value is not negative, appropriate phase score net and pos values are determined at step **760**. This determining occurs in a similar fashion as the determining of step **745**. The current weighting factor value is added to the appropriate phase net and pos scores identified at step **760**, as shown at step **765**, in a similar fashion as discussed with respect to step **750**. The newly calculated appropriate phase score net and pos values are then stored at step **770** in a similar fashion as the storing of step **755**, and flow continues to step **775** where the current call score is recalculated.

FIG. **8** illustrates a system for assisting an agent during a client interaction, in accordance with an embodiment of the application. Elements of FIG. **8** having reference numbers that have already been discussed may operate in a similar fashion, and will not be discussed in detail. As shown in FIG. **8**, a server **805** is shown, and includes a server processor **810** coupled with a server memory **815** and voice recognition processor **850**. The voice recognition processor **850** may be further coupled with the server memory **815**. The server memory may include a client database portion **820**, and a call database portion **845**.

The client database portion **820** may include information such as one or more client keyword sets/databases that may be utilized in identifying keywords and determining associated keyword information during a client interaction. For example, the client database portion **820** may include a Client #1 keyword set **825**, that provides keywords pertinent to Client #1's public switched telephone network (PSTN) business and associated keyword information. Client database portion **820** may further include a Client #2 keyword set **830** with associated keyword information appropriate for Client #2's healthcare business. Further, a Client #3 shipping/receiving client keyword set **835** with associated keyword information may be provided, and a Client #N's keyword set **840** and associated keyword information for Client #N's cellular service may be provided. In addition, in some embodiments, the server memory **815** may include a memory structure, for example, memory structure **843** that is similar to the memory structure **418** discussed above with respect to FIG. **6**, for example, where the call phase scores such as the current, positive and negative call phase scores are determined at the server. The server memory **815** may further include call database **845**, for example, to store call specific information for various voice interactions. The server memory **815** may further include an API portion **860** that may include software libraries, or other instructional code, allowing the server processor **810** to both unpack information received at the server, and to package information messages, for example, the transmission message **480** in a desirable communications protocol. An application portion **870** may be provided, that may provide applications, programming or other instructional code, allowing the server **805** to perform desired functions, for example, as described herein. As further shown in FIG. **8**, the client interaction **485** is routed through the server processor **810**, that generates the transmission message **480** providing the keyword and associated keyword information to the agent workstation **410**.

The server processor **810** is a processor capable of carrying out the server capabilities and programming, including routing client interactions through the server, generating transmission messages such as transmission message **480**, generating call-specific information records for the call data base **845**, as well as any other functionality performed by the server. The server processor **810** may be a single processor, or a bank of processors operating together, for example, connected through a communications bus or otherwise communicatively coupled as part of a local area network (LAN). Some devices or components of the server **805** may be physical, while others may be virtual, and the components may instead be distributed across multiple locations, and communicatively coupled by an appropriate network. The server memory **815** may be comprised of RAM, ROM, flash memory, hard disks, and/or any other type of volatile or non-volatile memory. The server memory **815** may be a single memory, or may be provided as a bank of storage devices, for example, coupled with the server processor **810** through one or more communications buses, or as part of a LAN, WAN or other network. The voice recognition processor **850** may be one or more processors capable of performing voice recognition on client interactions being routed through the server **805**. The voice recognition processor **850** may be coupled with the server processor **810** via a communications bus, or as part of a LAN, WAN or other network.

The server **805** may be coupled with the agent workstation **410**, for example, as part of a network, such as an LAN, a wide area network (WAN), through the PSTN, or via any other sufficient communications links that allow for the transmission of data like the client interaction and the data transmission **480** between the server **805** and the agent workstation **410**.

FIG. **9** is a flowchart illustrating operation of a computer system for assisting an agent during a client interaction, in accordance with an embodiment of the application. FIG. **9** will be discussed with respect to the GUI **100** of FIGS. **1-3**, the data structures of FIGS. **5-6**, and the system of FIG. **8**. Further, reference to the steps of the flowcharts of FIGS. **7**A and **7**B may be made.

As shown at step **905**, the agent workstation **410** subscribes to a property attribute changed event. This may occur in a similar fashion as described above with respect to step **705**, where at power-up, the agent workstation **410** utilizes the API **420** to subscribe to property change events related to a client interaction, including a call connected event, a keyword identified event, that may occur at the server **805**. The agent application is then started as shown at step **910**, for example, the agent application **416**, in a similar fashion as discussed above with respect to step **710** of FIG. **7**A. As shown at step **915**, the agent workstation **410** memory is allocated, for example, in a similar fashion as discussed above with respect to step **715**. Variables, arrays/databases and an error/event log are initialized as shown at step **920**, for example, in a fashion similar to as discussed above with respect to step **720**. In embodiments where call phase scores are determined at the server **805**, the memory structure **843** may be additionally initialized at step **820** in a similar fashion as discussed above with respect to step **720**. A GUI such as the GUI **100** is provided as shown at step **925**, for example, at the agent display **428** in a similar fashion as discussed above with respect to step **725**.

A keyword set is determined at step **930**. For example, the server processor **810** may determine an appropriate keyword set from the client database **820**. An indication of the client identity, for example, through a caller ID indication of the client interaction or through account information provided through the call initiation process, causes the server processor **810** to select the keyword and associated keyword information from client database **820** corresponding with the client identity for the current client interaction. For example, Caller ID and/or account information from the client interaction may indicate that the client is Client #2, and thus the server processor may determine at step **930** to utilize the health care keyword and associated keyword information **830** for Client #2 for that client interaction. Voice recognition is then performed at step **935**. For example, the server processor **810** may route the client interaction to the voice recognition processor **850**, that may utilize voice recognition and speech analytics techniques defined at the server memory (not shown) in performing the voice recognition. It may be determined at step **940** whether a keyword has been detected. This may be carried out, for example, where the voice recognition information of step **935** is passed to the server processor. The server processor **810** may compare the received voice recognition of the client interaction with the keywords of the keyword set determined at step **930**. A match within a specified confidence factor, indicates detection of a keyword or phrase at step **940**.

If a keyword has been detected at step **940**, associated keyword information for the keyword is determined at step **945**. This may occur, for example, by the server processor **810** retrieving associated information from the identified keyword set, such as interactive call phase, keyword category and weighting factor associated with the keyword identified at step **940**, from the client keyword set/database identified at step **930**. The keyword and associated keyword information is passed to the agent application as shown at step **950**. For example, the server processor **810** may utilize the API **860** to package the keyword and associated keyword information as a transmission message **480** to the agent workstation **410**.

The transmission message **480** may take the form of, for example, the transmission message **480** shown in FIG. **5**, thereby passing event subscription information **510** indicating that a property attribute changed to a keyword identified event subscribed to by the agent workstation **410** has occurred. The identified keyword **520**, and associated keyword information **530** that may include phase **540**, category **550** and weighting factor **560** may be packaged as event specific information **515** that is passed to the agent application **416** at step **950**. Thus, the agent processor **412** may receive the transmission message **480** from the server in a similar fashion as discussed above with respect to step **730**.

The GUI may then be updated at the agent application as shown at step **955**. Step **955** may be carried out in a similar fashion as described above with respect to step **732** of FIG. **7**A, and steps **735-775** of FIG. **7**B, where call phase scores are determined at the agent workstation.

In an alternate embodiment, the call phase scores may instead be determined at the server. In this alternate embodiment, referring to FIG. **7**B, the storing **735** may be accomplished at the server by the server processor **810** using the memory structure **843** that is similar to the memory structure shown at FIG. **6**. Thus, associated keyword information, including associated call phase, category and weighting factor determined at step **945** may be stored at the memory structure **843**, in analogous variable portions, array portions, and/or call score file portions as discussed above with respect to FIG. **6**. The determination of weighting factor being negative at step **740** may be performed by the server processor **810**. Where the weighting factor value is negative, the appropriate phase score net and neg values may be determined at step **745**. This may be accomplished, for example, where the current phase information determined at step **945** indicates that the associated phase for the identified keyword at **940** is the 'learn' phase, the appropriate phase values may be determined by retrieving the phase_learn_net_score and the phase_learn_neg_score values from the analogous variable portion **610** of the memory structure **843**.

Continuing with this alternate embodiment, at step **750**, the current weighting factor is added to the appropriate phase score net and neg score values determined at step **745**. For example, for the 'learn' phase example mentioned above, the value of the weighting factor determined at step **945** is added to each of the phase_learn_net_score and the phase_learn_neg_score values. At step **755**, the newly calculated values for the appropriate phase net and neg scores are stored back into the corresponding variables of the memory structure **843**. For example, the newly calculated values for the net and neg values calculated accounting for the weighting value associated with the learn phase are stored back into the analogous phase_learn_net_score and the phase_learn_neg_score variables of the memory structure **843**. The current call score value is then recalculated as shown at step **775**, for example, by retrieving the current call score value from the analogous current_call_score variable of memory structure **843**, adding the value of the weighting factor value to the current call score value, and storing the

newly calculated call score value back into the current_call_score variable of memory structure **843**.

Returning to step **740** in this alternate embodiment, where it is determined that the weighting factor value is not negative, appropriate phase score net and pos values are determined at step **760**. This determining occurs in a similar fashion as the determining of step **745** discussed above with respect to this alternate embodiment. The current weighting factor value is added to the appropriate phase net and pos scores identified at step **760**, as shown at step **765**, in a similar fashion as discussed with respect to step **750**, where the value of the weighting factor determined at step **945** is added to each of the phase_learn_net_score and the phase_learn_pos_score values of the memory structure **843**. The newly calculated appropriate phase score net and pos values are then stored at step **770** at the memory structure **843** in a similar fashion as the storing of step **755**, and flow continues to step **775** where the current call score is recalculated.

In this way, the current, positive and negative phase scores may be determined at the server **805** in accordance with an alternate embodiment of the application. Call phase scores may be maintained and transmitted to the agent workstation, for example, as variables (not shown) along with other keyword associated information, within event specific information **515** of the transmission message **480** of FIG. **5**, in a predetermined order.

Returning to FIG. **9**, at step **950**, keyword and keyword associated information may be passed to the agent application. Where the agent station determines phase score information, such associated keyword information may include the current keyword, and corresponding category, phase and weighting factor, for example, as the transmission message **480** shown at FIG. **5**. Where the server determines the phase scores as discussed with respect to the alternate embodiment above, the transmission message may further include phase score information, including current, negative and positive phase scores in a predetermined format (not specifically shown), within the event specific information **515** of the transmission message **480**.

The information from the transmission message **485** may then be used by the agent processor in updating the display at step **955**, in a similar fashion as described above with respect to step **732** of FIG. **7**A.

It may then be determined whether the client interaction is over at step **960**. For example, this may occur where the server **805** may receive an indication from within the client interaction **485** signaling an end to the client interaction. Where the client interaction is provided to the server as a Voice over IP (VoIP) message from a communications network such as the internet, the VoIP transmission protocol may indicate the end of the client transmission. Where the client interaction is provided from the PSTN, the cessation of voice for a predetermined period of time, a dial tone or an "on hook" indication may indicate the end of the client interaction.

If it is determined that the client interaction is not yet over at step **960**, flow returns to step **935** where voice recognition is carried-out on the client interaction. If it is determined that the client interaction is over at step **960**, flow continues to step **965** where the server processor may generate a property change event indicating that the client interaction is terminated. This may occur, where the server processor **810** generates a transmission message **480** indicating the call termination property attribute changed event has occurred, that is sent to the agent workstation **410**. Thus, the agent workstation **410** receiving the indication that the interaction has been terminated may cause the agent processor **412** via the agent application **416** to update the call score information as shown at step **970**. Updating the call score information at step **970** may be carried out in a similar fashion as discussed above with respect to step **734** of FIG. **7**A. In an alternate embodiment, the updating of call score information may be carried out at the server **805**, where call score information and call score files for all-time and daily call scores are maintained at the memory structure **843** in an analogous fashion as discussed with respect to FIG. **6**. In this embodiment, the server processor **810** may operate to update call scores in a similar fashion as described above with respect to step **734** of FIG. **7**A. In this alternate embodiment, the updating of the call score information may occur in the method of FIG. **9** between steps **945** and **950**. Though not shown in FIG. **5**, the call score information may be transmitted to the agent station as part of, for example, the transmission message **480** as part of the event specific information **515**, at step **950**, in a predetermined format.

Thus, after updating the call score information at step **975** (or after the updating keyword and keyword associated information of step **970** where call scores are dertermined at the server), the agent workstation is ready to receive additional client interactions. Additional client interactions may be handled in a similar fashion, for example, beginning at step **920**.

The transmission message **480** has been described as including current keyword and current associated keyword information. It accordance with an alternate or additional embodiment, where the memory structure **843** and/or the call database **845** includes and/or maintains keyword and associated keyword information for the entire client interaction to that point (as will be discussed below with respect to the flowchart of FIG. **12** and FIG. **13**), the transmission message **480** transmitted to the agent station may include keyword and keyword associated information for the entire client interaction each time a keyword is detected. In this embodiment, the memory structure **843** and/or call database **845** maintains in variable, array, or some other format, all keyword and associated keyword information that has been determined for a client interaction. Call score information (i.e., current, daily high, all-time high) as well as call phase scores may also be maintained. Though not specifically shown in FIG. **5**, the keyword and keyword associated information including category, phase, weighting factor and phase scores for each keyword, as well as call score information, may be provided to the agent station as part of the transmission message or call object, for example, within event specific information **515**. Such information may be provided as variables and/or arrays, or in whatever format the particular call object utilizes, each time a keyword is detected at the server. Such information may be provided in the transmission message in a predetermined format, where the agent processor is able to parse the information for the entire client interaction from the transmission message, and use the information to populate the various fields of the GUI **100**.

FIG. **10** illustrates a computer system for assisting an agent during a client interaction, in accordance with an embodiment of the application. As shown in FIG. **10**, the system **1000** may include a call interaction center (CIC) **1002** that may include a plurality of servers and storage devices coupled through a network, for example, by busses **1004***a* and **1004***b*, that may be communicatively coupled as part of a LAN or WAN. The servers may include CIC servers **1006**, shown as a switchover pair, one or more session manager servers, such as session manager servers **1008***a*-**1008***c*, as well as voice processing servers shown within

media voice processing server banks **1010***a* and **1010***b*. Further, storage may be provided, for example, as a bank of memories such as memory **1012** and/or off site storage, as a cloud memory storage **1015**.

The memory **1012** and/or cloud memory **1016** may include client database **1013**, an API **1014** and a call database **1015**. Though not specifically shown, the client database **1013** may include keyword sets and associated keyword information, for example, similar to the client database **820** and keyword sets **825-840** described above with respect to FIG. **8**. The API **1014** may include software libraries and/or other files or instructional code that allow the CIC server **1006** to receive message as a client transmission in its respective communications protocol, and perform any necessary unpacking and routing of the message(s). The API provides the necessary libraries allowing the CIC server **1006** to route messages to the session manager servers **1008***a-c*, media servers **1010***a-b*, and to the memory **1012** and storage **1016**. Further, the API **1016** includes files/libraries sufficient for allowing the handling of event subscriptions, and broadcasting property change events, as well as transmission messages from the CIC **1002** to the MPLS/QoS **1040** and/or to the various LANS **1050***a-c*. The API may further include libraries and files allowing for communicating to various applications or programming at the CIC **1002**. The API may thus include software libraries for handling, for example, VoIP protocols, IP protocols, Interaction Center Extension Libraries (IceLib) protocols, etc., used for the transferring of information between various servers, devices, memories and any programs/applications running at the CIC **1002**. The API **1014** may include other software libraries allowing the CIC **1002** to carry out the functionality described herein. The call database **1015** may store client interactions, for example, as log files, representing keyword and keyword associated information. For example, in addition to the keyword and keyword associated information discussed above, speech analytics information may be stored in a call log, such as confidence information that a particular word or syllable has been identified for the corresponding keyword/keyphrase detected, etc. The CIC **1002** may further include a firewall **1018**. The firewall may be a PCI firewall vault.

Though not shown, the memory **1012** or cloud storage **1016** may further include an application portion, similar to the application portion **870** discussed with respect to FIG. **8**, that may be used by the CIC for carrying out applications or other programming or functionality of the CIC. Further not shown, the memory **1012** or storage **1016** may include a memory structure similar to the memory structure **843** for use in determining phase scores at the CIC **1002**, and an error/event log file similar to that discussed above with respect to FIG. **6**. The error event/log file may include errors generated by the application, as well as events occurring while the application is running (i.e., indicating application start, telephony log in, keyword utterance events with associated keyword information, telephony log out, application close, etc. . . .).

The various servers and memory storage of the CIC **1002** may be located at a single location, or may be distributed across several locations. Thus, the data busses **1004***a-***1004***b* may represent LAN communications links, WAN communication links, or other network links that utilize the Internet, PSTN or other communications lines that are capable of providing the transmission of events and data between the servers and memory storage devices. Further, the CIC servers **1006** may be virtual at the CIC, residing within the cloud storage **1016**, for example, as part of a West Cloud implementation using CISCO USC infrastructure. The servers **1006** may reside behind the PCI firewall vault **1018**. The session servers **1008***a-***1008***c* may be physical.

A client interaction (i.e. a voice call) represented at **1020** may be received at the CIC **1002**. The client interaction representation at **1020** may be, for example, an interaction converted to a VoIP communications protocol as discussed below. Thus, client interaction **1020** may be one or more message packets representing a client interaction between a client and an agent. The client side/channel of the client interaction **1020** may be, for example, one of the various devices **1022***a-***1022***k* shown. for example, the client side of the client interaction **1020** may be initiated through the PSTN **1024***a* for devices **1022***a-***1022***b*, may be received via a level 3 local session internet protocol (SIP) network such as SIP **1026***a* or **1026***b*, that serve, for example, devices **1022***c-***1022***d* and **1022***g-***1022***h*, respectively. The client side may be supported by multi-protocol labelling switch (MPLS) telephone routing shown at **1028***a*, for example, that serves devices **1022***e-***1022***f*, and MPLS routing **1028***b*, that may serve devices **1022***i-***1022***j*.

The client interaction may be converted to a VoIP protocol transmission at SONUS servers **130***a-***130***c*. The SONUS servers may utilize the SONUS GSX architecture in providing VoIP conversions, thereby providing an internet protocol (IP) client side end point for a particular client interaction represented at **1020**. The SONUS VoIP servers **130***a-***130***c* may be communicatively coupled with a SIP server **1035**, for example, using the SIP protocol to provide the client interaction **1020** to the CIC **1002**. The SIP server **135** may be, for example, an ATL manufactured server, thereby providing IP endpoints for VoIP servers **1030***b-***1030***c*. The CIC server **1002** may further be coupled, on the agent's side to various LANs such as LANs **1050***a-***1050***c*, through, for example, the MPLS/quality of service (QoS) network **1040**. The LANs **1050***a-***1050***c* may be located within the same facility, within the same town or city, or located in different cities. A transmission message **1025** is shown, that may be used to transmit information for a client interaction to an agent station. For example, the transmission message **1025** may be a property attribute changed event for an event subscribed to at the CIC **1002**, and/or transmit data to an agent station, such as keyword and keyword associated information identified during a client interaction. As such, the transmission message may include similar information as the transmission message **485** discussed above with respect to FIG. **5**. The transmission message may, in an alternate embodiment described above with respect to FIG. **9**, include all keyword and keyword associated information, and/or call score and phase score information for a client interaction to that point.

Looking at a representative LAN **1050***a* that may support one or more agents, various stations and agent devices are provided, such as an agent station **1060** utilizing a VoIP phone, a plain old telephone service (POTS) device **1062**, that may be converted to a network or VoIP protocol via gateway **1064**. Further, an analog phone station **1066** may be provided, that handles the conversion between the agent and the client to a network or VoIP protocol, and a headset station **1068** and network telephone terminal station **1070**, where each are capable of communicating with a client via a network and/or VoIP communications protocols. The other representative agent LANs **1050***b-***1050***f* may include similar components.

A typical representation **1075** is provided for an agent LAN, For example, the agent LAN **1050***a*. As shown, agents may utilize workstations **1080***a-***1080***c*, that may include

headsets or other devices not shown allowing them to communicate with a client. In addition or in the alternative, network telephone stations **1082***a*-**1082***b* correspond with respective workstations **1080***a*-**1080***b* and/or **1080***c*, allowing an agent to communicate with the client, either directly, through an agent station, or through a gateway **1084**. A supervisor station **1086** is shown, as well as a remote content server **1088**, for example, that may manage communications between the agents using stations **1080***a*-**1080***c*, network telephone devices **1082***a*-**1082***b*, and a supervisor **1086**, with an outside network such as the MPLS/QoS network **1040**, via LAN **1050***a*.

A typical agent station, such as **1080***a*-**1080***c*, may functionally be as described above with respect to the agent station **410** discussed above with respect to FIG. **4**. The agent stations **1080***a-c* may utilize an Intel i5 processor, and include 8 gigabytes of RAM, and a 500 GB hard drive. Other workstation specifications/capabilities may be utilized. The agent stations **1080***a*-**1080***c*, for example, may provide the agent application, for example, the agent application **416**, that generates, maintains and provides the graphic user interface **100** described with respect to FIGS. **1-3**. The agent application may be provided, for example, in a Windows presentation format (WPF) application, utilizing a C# code base that runs as a stand-alone application on the agent station. Agent stations such as stations **1080***a*-**1080***c* may be equipped with appropriate APIs (not shown in FIG. **10**), to listen for subscription property attribute changed events subscribed to at the CIC servers **1006**, the events, for example, including call connected, keyword spoken, and call termination events. Other subscription events may be subscribed to. Thus, the agent stations **1080***a*-**1080***c* are able to listen for property attribute changed events for their subscribed events for a particular client interaction, and upon detection of a property change event, will receive an appropriate transmission message providing information relative to the particular subscription event subscribed. For example, where the property attribute changed event from the CIC **1002** indicates that a keyword has been detected within a client interaction **1020** involving the particular workstation, the CIC **1002**, for example, CIC servers **1006**, provide the keyword and keyword associated information to the respective workstation handling the client interaction. The subscription events and transmission message may be accomplished between agent stations and the CIC **1002** using, for example, IceLib at the API **1014**, for example, that is a software development kit (SDK) providing access to a library of API objects running on the CIC server **1006** as a PureConnect product, with server version CIC 2016 r4 having a current SDK as 2015 r3.

FIG. **11** illustrates an exemplary client keyword set/database and associated keyword information for a client, in accordance with an embodiment of the application. The database of FIG. **11** may be stored at client database portion **1013** of the CIC **1002**. The exemplary client keyword database represented at FIG. **11** may instead be provided via cloud storage **1016**. As shown in FIG. **11**, the exemplary client database **1100** may include a phase column **1105**, category column **1110**, a keyword or keyphrase column **1115**, and a keyword score (weighting factor) column **1120**. The keyword/phrase column **1115** includes keywords that the CIC server **1006** searches for during a client interaction. The phase, category and score columns **1105**, **1110**, and **1120** provide associated keyword information that corresponds to a particular keyword or phrase that may be identified during the client interaction **1020**.

The keyword database **1100** may provide information for various phases of a call. For example, as shown at **1125**, a keyphrase "on a recorded line" of column **1115** may be associated with phase information 'learn' of column **1105**, category information 'Engage Customer' of column **1110**, and with a '1' value for weighting factor of column **1120**. The weighting factors shown in the keyword score column **1120** may be progressively weighted, increasing in value as a call phase increases from the 'Learn' phase through a 'Post Buy' phase. Further, the weighting factors may have positive or negative values. As shown in FIG. **11**, a keyword phrase "provide you with any assistance" may be associated with a positive weighting factor of '1' as shown at **1135**, where the positive value for the weighting factor indicates that the keyword or key phrase is one that is encouraged to be used by the agent. The keyword weighting factor may also have a negative value, for example, as shown at **1140** associated with a keyword phrase "just checking in", where the negative value associated with the weighting factor indicates that the corresponding keyword is one the agent is discouraged from using.

The exemplary client database **1100** is merely a representative, and as shown may be a partial database. More keyword/keyword phrases may be provided for each of the keyword phases and categories. As discussed above, a keyword may be a single word, or multiple words that together form a phrase. Further, the keyword categories shown at column **1110** are representative as well, and additional keyword categories may be associated with additional keywords provided for each of the phases of a client interaction. Further, the client database of keyword and keyword associated information may be altered or updated, for example, to encourage (or discourage) the use of additional keywords. Thus, additional keywords may be added (or subtracted) from the client keyword database. Further, other category and/or phase information may be used to classify additional keywords, where desirable for a particular client product, service or circumstance.

The client interaction may be initiated by either a client or an agent. Where a client initiates a client interaction, such an interaction may be initiated, for example, at any of the devices **1022***a*-**1022***k*, where a telephone number for assistance is dialed. An operator or DTMF menu structure may be provided to the client, allowing the client to provide their client information such as a client account number, identification number or the like, and indicating why they are seeking an interaction. The CIC **1002** receives the client interaction information, for example, as client interaction **1020**, and determines an appropriate agent for routing the interaction. The CIC **1002** then establishes a communication path to connect the client with an appropriate agent, for example, an agent that utilizes agent station **1080***a*.

Instead, a client interaction may be initiated from the agent side, where an agent (or an automated dialer) dials a client telephone number. For example, the agent side may be initiated from an agent terminal **1080***a*, from within a particular agent LAN, such as LAN **1050***a*, or may be initiated from the CIC server **1002**, and upon connection with a client, the CIC ties the agent to the call.

FIG. **12** is a flowchart illustrating the operation of the system of FIG. **10** in assisting an agent during a client interaction, in accordance with an embodiment of the application. The discussion of the flowchart of FIG. **12** may refer to the GUI **100** of FIGS. **1-3**, the systems of FIGS. **4** and **8**, and to the exemplary client keyword database of FIG. **11**. The flowcharts of FIGS. **7**A, **7**B and **9** will also be made

reference to. For the flowchart of FIG. **12**, it is assumed that the agent station has been powered-up.

As shown in step **1205**, an agent station, such as the station **1080***a*, is initiated. This may occur in a similar fashion as described above with respect to step **705** of FIG. **7**A, where the agent station subscribes to certain events occurring at the CIC.

As shown at step **1210**, the client interaction **1020** is connected by the CIC server. For example, the CIC server **1006** may utilize information provided within the client interaction by the client and/or a reason for their call to determine an appropriate agent with which to connect the call, and route the call to the agent, for example, through MPLS/QoS **1040**, to the LAN **1050***a*, and to agent station **1080***a*. The client interaction may be provided to the CIC **1002**, for example, using SIP protocols, and transmitted from the CIC **1002** to an agent using IceLib protocols as part of an API software library package common to the CIC **1002** and the agent stations, including station **1080***a*. Any necessary communications protocol layering may be employed, for example, to allow the client interaction and any transmission message(s) **1025** to be transmitted to the agent station **1080***a*, for example, using the MPLS/QoS network **1040**, and LAN **1050***a*.

As shown in step **1215**, an agent application is initiated. Though not shown in detail, the agent stations, for example, station **1080***a*, may be similar to the agent station **410** discussed above with respect to FIGS. **4** and **8**. When initiating the agent application, a call initiation subscription property change event may be sent from the CIC server **1006** to the agent station **1080***a* (i.e. as part of, or triggered by, the completion of step **1210**) that subscribes to subscription property attribute changed events such as call initiation, keyword identification, and call termination. The attribute property changed event may be provided by the CIC server **1006** as part of the completing of step **1210**. The application initiation of step **1215** may occur in a similar fashion as described above with respect to steps **710**-**720** of FIG. **7**A. Reception of the call initiation subscription event property change may cause the agent application to open at the agent station **1080***a* in a similar fashion to agent application **416** being started at step **710**. Memory allocation and variable/array initialization may occur at the agent station **1080***a* in a similar fashion as described with respect to step **715** and **720**.

After the agent application is invoked at step **1215**, a GUI is provided at step **1217**. The GUI may be provided, for example, as the GUI **100**, at a display of the agent workstation **1080***a* in a similar fashion as described above with respect to step **725**.

As shown at step **1220**, the CIC server **1006** may route the interaction through a media voice processing server of the media servers bank **1010***a*, to provide voice recognition for the client interaction. In the alternative, the CIC server **1006** may allow the media server to tap the client interaction. The routing **1220** may also include a session manager server, i.e., sessions manager server **1008***a*, storing the client interaction as a voice recording at the memory **1012** and/or cloud storage **1016** as recordings indexed and stored on separate SAN partitions attached to the session manager. The voice recording may be tapped at the media server.

As shown at step **1225**, the CIC server **1006** may initiate a call log file within the call database portion **1015** for the client interaction. The call log record may store information for a call upon detection of a keyword, including the keyword and associated keyword information like associated phase, category and weighting factor, as well as a date and time stamp for the portion of the call where the keyword was identified. Other information may be stored as part of the call log, as disclosed below. The generation of the call log file during the client interaction will be discussed in more detail with respect to FIG. **13**.

As shown at step **1230**, the appropriate client keyword database is determined by the CIC server **1006**. This may be accomplished in a similar fashion as discussed above with respect to step **930** of FIG. **9**. For example, utilizing caller ID information and/or account information provided by a client, the CIC server **1006** may identify the appropriate database to be utilized for the current client interaction from the client database portion **1013**.

As shown at step **1235**, it is determined whether a keyword or keyword phrase has been detected within the client interaction. For example, the CIC server **1006** receiving the voice recognition from the media servers **1010***a* of step **1220**, may compare the voice recognition with the identified keyword database of step **1230**. Speech analytics may be utilized in determining whether the particular keyword and/or phrase within the client interaction is identified, for example, in a similar fashion as described above with respect to step **940** of FIG. **9**. The client keyword database **1013** may further include information in each client keyword database useful to the CIC server **1006** in identifying whether a keyword has been detected. For example, phonetical information, along with confidence factors for each phonetic syllable and/or word, may be utilized in making the keyword identification at step **1235**.

Where a keyword has been detected at step **1235**, flow continues to step **1240** where keyword associated information is determined by the CIC server. For example, the CIC server **1006** may access the appropriate client database of client database portion **1013** in which the keyword was identified, and retrieves the associated keyword associated information, for example, a phase, category and weighting factor associated with the identified keyword.

As shown at step **1245**, the call log for the client interaction may be updated. For example, the keyword and associated keyword information, as well as a date and time stamp for utterance of the keyword may be stored as part of the log file of call database portion **1015** initiated at step **1225** above. This may include updating variables stored at the CIC server **1006**, for example, a current_keyword, current_keyword_category, and current_key_phase and current_keyword_weight factor variables that are used to populate the update to the call log file. Other information may be stored, for example, confidence indications pertinent to the particular syllable or word for the particular keyword identified. Upon detecting a change to one or more of these variables, the CIC server **1006** may generate a transmission message, for example, the transmission message **1025**, as shown at step **1250**. The transmission message may include the property attribute changed event, and keyword and keyword associated information for a keyword variable and other variable associated therewith that have changed at the CIC server **1006**. The transmission message may take the form described above with respect to FIG. **5**. The transmission message **1025** may instead utilize any appropriate format. For example, transmission message may be generated as a call object within the CIC server **1006**, assigning properties for the information to be transmitted (i.e., subscription event, keyword and keyword associated information) as respective strings and integers, to the API **1014** that handles the transmission using IceLib SDK. The transmission may be generated as one or messages, using one or more packets of data. In one embodiment, the transmission

message includes keyword and keyword associated information for only the current keyword identified. In another embodiment, the transmission message includes keyword and keyword associated information for all keyword and corresponding keyword associated information, for the entire client interaction to that point. In this later embodiment, the call log database **1015** may be utilized along with other information stored at the memory **1012** or storage **1016** that maintains call score and/or phase score information, to provide the information transmitted via the transmission message.

The transmission message is then transmitted to the agent station as shown at step **1255**. For example, the CIC server **1006** may utilize the Iceib SDK that supports subscribing to events, and subscription property changes, and transmit the transmission message. The IceLib may utilize additional communications layers and protocols to allow the message to be routed to the appropriate agent station, for example, the agent station **1080***a*.

The subscription property attribute changed event and keyword and keyword associated information is received at the agent station, as shown at step **1260**. The agent station **1280***a*, using a resident API, is able to parse the message and provide it to its agent application running thereon. For example, the agent station may include the IceLib SDK as part of its API, that it may use to determine that the property attribute changed event has occurred, and to determine the keyword and keyword associated information from the transmission message (i.e., the passed object from the CIC server **1006**) to pass on to the agent application. The keyword and keyword associated information may be for the current identified keyword, or in an alternate embodiment, may be keyword and associated keyword information, as well as call score information and phase scores for the entire client interaction to that point in time.

The GUI, for example, GUI **100**, at the agent station **1080***a* may then be updated as shown at step **1265**. For example, the agent application, receiving the information for a currently identified keyword and keyword associated information, may update the appropriate phase scores associated with the phase of the received keyword, accounting for the received weighting factor, as well as updating keywords and associated keyword information within the GUI **100** in a similar fashion as discussed above with respect to step **734** of FIG. **7**A and steps **735-775** of FIG. **7**B. Embodiments where the current, positive and/or negative phase score is determined at the server **1006** (for example, as discussed with respect to FIGS. **8** and **9**), or at the agent work station (i.e., as discussed with respect to FIGS. **4** and **7**), are contemplated. In the alternative, the keyword and keyword associated information may be updated as indicated with respect to step **970** of FIG. **9**.

As shown at step **1270**, the CIC server **1006** determines whether a client interaction is over. For example, a message received from the SIP server **1035** for the client interaction **1020** within the VoIP communications protocol may indicate that the client interaction has been terminated. Where the interaction is determined as not terminated at step **1270**, flow returns to step **1235**. Where it is determined that the client interaction is over, flow proceeds to step **1270** where the client interaction is closed at the CIC **1002**. For example, the CIC server **1006** may send a subscription property attribute changed event indicating call termination to the agent station **1080***a* subscribed to the CIC **1002** for such an event. The CIC server **1006** may close any recording files that recorded the client interaction, as well as closing the call log file of step **1225** for that client interaction.

The client interaction is closed at the agent station as shown at step **1280**. This may occur in a near simultaneous fashion as the closing of step **1275**, and in a similar fashion as described above with respect to steps **733-734** of FIG. **7**A. For example, the property change event indicating call termination may be received at the agent station **1080***a*, and the agent station may perform any final updating of call scores. At this point, the agent station **1080***a* is ready for a new client interaction. When a new client interaction is initiated, the agent application may reinitialize and set to zero any variables and arrays, and repeat as described above with respect to step **1220** with the interaction being routed through the media server.

In an alternate embodiment, similar to the alternate embodiment discussed with respect to FIG. **9**, it will be appreciated that a transmission message may include keyword and keyword associated information, as well as call score information, for an entire client interaction to that point. In a further or alternate embodiment, it will be appreciated that the phase score information may be determined at the server **1006** and transmitted to the agent workstation, for example, in a similar fashion as discussed above with respect to FIGS. **7**B, **8** and **9** above. In the alternative, the phase score information may be determined at the agent work station, as discussed with respect to FIGS. **4**, **7**A and **7**B above. Though not specifically shown, it will be appreciated that the agent application may detect and record errors and events that occur during its operation that are saved as a text file. Such events, may include, for example, events indicating application start, telephony log in, keyword utterance events with associated keyword information, telephony log out, application close, etc. . . . .

FIGS. **13-15** will now be discussed. FIGS. **13** and **14** illustrate a representative call log file generated at a the CIC and array generated at the agent workstation, respectively, for a client interaction where the keywords set forth in the client keyword database of FIG. **11** are identified during a client interaction, in accordance with an embodiment of the application. As discussed above, the array may instead be generated at the server, for example, at the memory structure **843** of FIG. **8**, or the memory **1012** or storage **1016** of FIG. **10**. FIG. **15** is a scoring state table, illustrating the alteration of the various phase scores as keywords of client keyword database of FIG. **11** are identified, in accordance with an embodiment of the application. For the purposes of FIGS. **13-15**, all specified keywords of the exemplary client keyword database of FIG. **11** are assumed to have been identified.

As mentioned above, the client keyword database file of FIG. **11** is merely representative, as typical client keyword database file contain more keywords per phase, and keywords associated with additional categories in each phase. References will be made back to the flowcharts of FIGS. **7**A, **7**B, **9** and **12**, as well as the systems of FIGS. **4**, **8** and **10** and the exemplary client keyword database **1100** of FIG. **11**.

As described with respect to FIG. **12**, a call log file like the call log of FIG. **13** for a client interaction is initiated at step **1225**, and updated as keywords are identified in the client interaction at step **1245**. As shown in FIG. **13**, the call log record (i.e., at call database portion **1015**) may be used to record a keyword identified during the client interaction at **1305**, as well as a phase, category, weighting factor, and date/time associated with the identified keyword at **1301**, **1303**, **1307** and **1309**, respectively. As discussed above, other information may be stored in the call log file. As described at step **735** of FIG. **7**B, a currently identified keyword and keyword associated information is stored in an

array (i.e., of the array portion **620** of the information storage **418** of FIG. **4**, the memory structure **843** of FIG. **8** or the call database **1015** of FIG. **10**). The array of FIG. **14** illustrates such an array. As shown in FIG. **14**, an array may be utilized to maintain lists of keywords at column **1406**, and keyword associated information such as the phase, category and score corresponding with the identified keyword, at columns **1402**, **1404** and **1408**, respectively, for a client interaction. The array of FIG. **14** may be utilized in populating the keyword list, for example, keyword list **210**, that is displayed when keyword list expansion button **140** is selected within the GUI **100**. Thus, after the client interaction has begun, but before any keywords have been identified, the call log file shown at FIG. **13** and the array shown at FIG. **14** would contain no entries.

FIG. **15** illustrates an exemplary score state table that shows the progression of how the scores change for the various phases as keywords are identified during a client interaction. The score state table of FIG. **15** represents changes to the score values for the various phase scores and current call score, for example, that may be maintained at the variable portion **610** of FIG. **6**, the memory structure **843** of FIG. **8**, or the memory **1012** of FIG. **10** for a client interaction. The score state table will represent each phase score that is displayed through the GUI **100** discussed above. Thus, the state table includes columns for net phase scores **125***a*-**125***e*, positive phase scores **130***a*-**130***e* and negative phase scores **135***a*-**135***e*. A current call score **145** is shown. For convenience, a column indicating the phase and weighting factor for the keyword affecting the score is provided at **1502**. Thus, at the beginning of a client interaction before any keywords are identified, no scores would have yet been altered, so the current score for all phases and the current call score would be as shown at line **1505** as "0."

Upon detecting a keyword during the client interaction, for example by the CIC server **1006** at step **1235**, the call log is updated with the keyword and keyword associated information, at step **1245**. Further, the identified keyword and associated keyword information is received at the agent station, for example, as described at step **730** of FIG. **7**B, step **945** of FIG. **9** or step **1260** of FIG. **12**. Appropriate phase scores and the call score are calculated, for example by the agent processor, as described with respect to steps **740**-**775** of FIG. **7**B. Such calculation may be carried out at the server processor or the agent workstation as discussed above with respect to FIG. **9**.

Referring to FIGS. **11**-**15**, a keyword is identified during the client interaction, where the keyword is 'calling on behalf of company A' of FIG. **11**. The CIC server **1006** may then identify associated keyword information, including that the keyword is associated with the 'Learn' phase, for an 'introduction' category, with a weighting factor of '1', for example, as described with respect to step **1235**. The CIC server **1006** may then update the call database log represented at FIG. **13**, stored at call database portion **1015** by adding a line **1310** the log database file of FIG. **13** for the client interaction. Upon identifying whether a keyword has been detected at step **1230**, the CIC server may provide a date time stamp of the detection of the keyword for line **1310**, here indicating in column **1309** that it was detected on 2018 month 3 day 12 at 13 hours 42 minutes 5 seconds and 3 milliseconds time frame. Upon receipt of the keyword and associated keyword information at the agent station, the agent processor may store the keyword and keyword associated information in the array of FIG. **14** at line **1410**. Line **1410** may thus indicate a phase 'Learn' at column **1402**, keyword category 'Introduction' at column **1404**, and keyword score of '1' at column **1408** for the identified keyword 'calling on behalf of Company A.'

The scoring updates represented by the scoring state table may be determined, for example, as described with respect to steps **740**-**775** of FIG. **7**B. As discussed above, such phase score determination may occur at the agent station, or at the server. Thus, upon the detection of the 'calling on behalf of company A' keyword, the associated keyword weighting factor of '1' is added to the current net and pos phase scores **120***a*, **125***a*, for the learn phase, and to the current call score **145**. The appropriate phase score values are taken from line **1505**, added with the weighting factor value, and stored back as the values in line **1510**, thereby showing the affect of the keyword having been identified for the 'learn' phase with a value of '1.' This yields the changes shown at line **1510**, where the pos and net scores **120***a*, **125***a*, as well as the current call score **145**, are each updated to values of '1'. Thus, the score state table shows that both the pos and net 'Learn' phase scores **120***a* and **125***a* for the learn phase **120***a* would each be updated on the GUI **100** with values of '1.' The current call score **145** would also be updated to a value of '1' of the GUI **100**.

The process repeats for the remaining keywords and associated keyword information shown in the exemplary client keyword database file of FIG. **11**. For example, the next keyword identified may be the 'on a recorded line' phrase, with associated keyword information for the 'Learn' phase, 'Engage Customer' category and a weighting factor of '1.' The keyword and associated keyword information is stored in the call log file of FIG. **13**, as shown at line **1320**, with the date/time stamp shown at column **1309**. The keyword, phase, category and weighting factor value is stored as well in the array as shown at line **1420** of FIG. **14**. Further, the weighting factor '1' is added to the current learn phase pos and net score values **125***a* and **130***a*, and the current call score value **145**, and the resulting sum stored in the respective locations shown at line **1520**. Thus, the GUI **100** 'Learn' pos and net scores **125***a* and **120***a*, and current call score **145**, are all displayed as indicated at line **1520**, with values of '2'.

The next keyword identified is the 'do you have any questions about' phrase from FIG. **11**, and the keyword and its associated keyword information is stored in the call database file of FIG. **13** as shown at line **1330**. Agent array file of FIG. **14** is also updated, for example, as shown at line **1430**, with the newly identified keyword and keyword associated information. Referring to FIG. **15**, the current weighting factor value of '2' and the current phase 'define' causes the value of '2' to be added to the define pos and net scores **130***b*, **125***b*, and to the current call score **145**, resulting in the current call scores shown at line **1530** for the various phases and the current call score. Thus, the pos and net scores for the define phase **130***b* and **125***b* are each updated to be '2', with the current call score being updated as '4' at GUI **100**.

The next identified keyword is the 'provide you with any assistance' keyword phrase of FIG. **11**, that results in the call log file of FIG. **13** being updated by the addition of line **1340**, the array shown in FIG. **14** to be updated by the addition of line **1440**, and the score state of FIG. **15** to be altered as shown at line **1540**. One item of note, is that the identified keywords during a client interaction may not occur in phase order. For example, referring to the log file of FIG. **13** that has recorded identified keywords in the order in which they have occurred in the client interaction, a keyword relating to the 'Learn' phase was recorded at Line **1320**. The next keyword identified in the interaction was

associated with the 'Define' phase, shown at line **1330**. The next keyword identified was associated back with the 'Learn' phase as shown at line **1340**.

The next identified keyword is the 'just checking in' phrase, resulting in updating the call log file of FIG. **13** by the addition of line **1350**, and the updating of the array of FIG. **14** with the addition of line **1450**, and the alteration of the score state shown at FIG. **15**, as shown at line **1550**. One item of note here, referring to FIG. **15**, is that the weighting factor is a negative value, here, '−2'. This caused the neg phase value **135***b* for the 'Define' phase to be added, resulting in a value of '−2', and caused the value of '−2' to be added to the net define score **125***b*, for a resulting net phase score for the define phase **125***b* to become '0.' This negative weighting value of '−2' was also added to the current call score **145**, resulting in a reduction of the current call score from a value of '5' to a value of '3'. The negative define phase score **135***b* would indicate to the agent that a keyword/keyphrase was identified that is not desired.

Though they won't be discussed in detail, the remaining keywords of FIG. **11** are assumed to have been identified in the order they are shown in FIG. **11** during the client interaction. This results in the addition of lines **1360-1390** of the exemplary call log file of FIG. **13**, the addition of respective lines **1460-1490** to the array of FIG. **14**, and the alteration of the call scores as shown in respective lines **1560-1590**, used to display phase scores and call scores that are displayed on the GUI **100**.

FIG. **16** provides an exemplary GUI that may be provided resulting from the keywords being identified as indicated in the call log file of FIG. **13**, in accordance with an embodiment of the application. The GUI is shown as the GUI **100** of FIGS. **1-3**, that is populated with the keyword list **210** generated from the array of FIG. **14**, along with the current call score information provided, as represented from the line **1590** of the call scores shown in FIG. **15**. In this case, the current keyword, shown at line **1490** of FIG. **14**, is displayed at keyword **105** as "thank you for choosing", with the current keyword category **110** from line **1490** as "<Category X>" (representing the category associated with "thank you for choosing"). As discussed above, line **1590** represents values of the variable portion **610** of FIG. **6**, for the respective call phase variables and the current call score variable. The daily high score of FIG. **16** indicates that the agent had a daily high call score of 57, and all time high score of 155. The daily high call and all time high scores may be retrieved from, for example, the call scores file of call scores portion **630** shown in FIG. **6**, or may be provided by the memory structure **843** of FIG. **8** or the memory **1012** of FIG. **10**. Further, as shown in FIG. **16**, the agent has expanded the keyword list **210** by selecting the keyword expansion button **140**. This resulted in the keyword list **210** being populated from the information stored in the array of FIG. **14**. In an alternate embodiment discussed above with respect to FIG. **9**, where all keyword and associated keyword information is provided in the transmission message, the most recent transmission message may be utilized to populate the keyword list **210**.

The above embodiments have described keywords and keyword phrases as being identified from an agent channel of a client interaction (i.e., from the agents speech). The above systems and flowcharts could be employed as well to a client channel of the client interaction. For example, the keyword databases may have specific portions dedicated to keywords to be identified within the client channel, for one or more phases of the call. In the alternative, a separate client database may be provided listing only client channel keywords, such that the CIC server may identify two client databases for a client communication at step **1230**, for the agent channel and one for the client channel. Identifying client channel keywords and transmission of the same may occur in a similar fashion as discussed above at step **950** and step **1255** for the agent channel.

The client channel may be represented in the GUI, for example, by including keywords in the client channel in the phase scores, i.e., **125***a*-**125***e*, and the current call score **145**. Instead, or in addition, the client channel identified keywords may be represented at the GUI through inclusion in the current keyword/category portions **105**, **110** of the GUI **100**, and/or as part of the Keyword list **210**. A second GUI similar to GUI **100** may also be utilized and displayed adjacent the GUI **100**, where each GUI **100** displays call score information for its respective channel (i.e., agent channel or client channel) of the client interaction. The client channel keywords may also be color-coded, for example, as a single color dedicated to client channel keywords, or by phase in a similar fashion as for the agent channel keywords. The client channel keywords may also be identified in the phase scores, i.e., **125***a*-**125***e*, and the current call score **145**.

In some embodiments, the phases may be provided in the GUI in a logical order/sequence that would typically occur during a client interaction. For example, such an order may include the order shown in FIG. **1**, as "Learn", "Define", "Assess", "Buy", "Post Buy." Other phase ordering may be utilized. In addition, it has been described that the weighting factors may be progressive in nature, increasing for each interaction phase. In some embodiments, such call phase order and/or weighting factor values for each phase may be consistent among implementations of the agent application GUI, thereby providing agents a logical conformity/uniformity and/or consistency in the application instances. For example, the phase order and/or weighting factor values may be consistent and displayed in a similar fashion between implementations of the agent application. In this example embodiment, a consistent sensory experience is provided for agents utilizing the application, and may assist in aligning agent behavior, when using the application for various clients and/or instances of the application. This may reduce the chance of misinterpreting the information being provided by the GUI for any particular client or interaction, and reduce training time required for using the application between clients.

Though the subscription property changed events have been described as being used to provide the information for the current keyword and keyword associated information identified during a client interaction, the subscription event may instead provide information for the entire call. For example, the call log of the call log database **1015** may thus be used to populate the subscription event message that includes all keywords and keyword associated information for the interaction. When received at the agent station, the agent application may utilize only the most recent (current) identified keyword and associated keyword information from the message and operate as described above for populating the array of FIG. **14**. In the alternative, the array of FIG. **14** may be completely repopulated each time a keyword is identified, with the information provided through the subscription event message.

Though the application has discussed the use of subscription property attribute changed events as a trigger and way of transmitting information to the agent workstation for processing and displaying by the agent application, other messages may be employed. Thus, event indicating as call initiation, keyword identification and call termination, as

well as information transmission of keywords and keyword associated information, may occur using other message formats and/or data packet configurations, account for the various APIs and other communications protocols utilized within the system employing the agent application to provide a GUI like the GUI **100**.

The agent station and server have been discussed above showing the agent processor and server processor sending or receiving communications, for example, the transmission message **480** and client interaction **485**. It will be appreciated that the application workstation and server may each include an appropriate network interface or adapter, for communicating with other components or devices through different types of networks, such as the Internet, PSTN, LANs, WANs, MPLS, etc.

The communications bus structures discussed herein may be memory, processor, or communications bus structures. Such bus structures may be, for example, any of an Industry Standards Architecture (ISA) bus, a Micro Channel Architecture (MCA) bus, an Enhanced ISA (EISA) bus, and a Peripheral Component Interconnects (PCI) architecture bus, or any other bus architecture appropriate for performing the functions set forth herein.

The agent application has been described as being implemented as a WPF application, utilizing a C# code base that runs as a stand-alone application on the agent station. The agent application may be instead be carried out in other languages, including one or more of object oriented languages such as JAVA, C++, conventional procedural languages like C, scripting languages such as Pearl and VBS, functional languages such as Lisp and ML, and/or logic oriented languages such as Prolog.

In some embodiments, the information displayed by the agent application may be provided at the GUI in a different order, format and/or configuration, while still providing at least some of the advantages described herein. Thus, the application should not be limited by the arrangement or configuration of the GUI **100** discussed above with respect to FIGS. **1-4**, **8** and **16**.

Systems, methods and non-transitive computer readable medium have been described for assisting an agent during a client communication. Such systems, methods and non-transitory computer readable medium allow for the assisting of an agent during a client communication, substantially in real time while the client interaction is occurring. The agent application allows for providing a GUI, such as the GUI **100**, to be built and updated, thereby allowing an agent to have an indication as to how the client interaction is progressing in real time or near real time. An agent may examine the scores for the various phases to determine if it would be beneficial to revisit a particular phase(s) of the interaction to collect further data to assist the client. Further, where a client asks questions or otherwise directs a call to a different interaction phase or topic not currently being explored by the agent, the agent may address the client's question or concern even if it would not be the next topic normally discussed, or if it revisits a prior topic or phase already discussed. Information addressing the client question or concern would be updated within the GUI by the agent application, allowing the agent to again reassess from the GUI which phase and/or topics should be addressed in the interaction after addressing the client's question or concern.

If the agent utilizes keywords or phrases that are not encouraged (i.e., are associated with a negative weighting factor), the negative score display for the phase as well as the current keyword information provides nearly instant feedback to the agent, thereby reinforcing agent behavior to avoid the keyword or phrase in the future.

Information, including keyword, category, and/or phase score is provided as part of a single, readily accessible and intuitive GUI. Thus, unlike conventional computer programs, where the agent would be required to scroll through and scan screens of information to make a determination about the status of the client interaction, and which topics to visit or revisit, the GUI disclosed herein would allow the agent to make the determinations in a quick fashion, as the pertinent information such as keywords and associated information is provided and easily accessible and observable through the provided GUI. Thus, unlike conventional computer programs where the agent may have needed uncomfortably long pauses to attempt to ascertain information from previous program screens, and likely would miss important information that would have been valuable in assisting the client, the present system employing the agent application that provides the GUI allows the agent to address the client's needs and questions even if off-topic or off-phase, while readily reassessing the state of the client interaction. Thus, using the system, agent application and the GUI described herein, the agent may quickly get back on track to determining further important issues and topics that need addressing in order to serve the client's needs. In addition, the complexity of determining the various keywords identified during the interaction, and maintaining an indication as to how complete the various call phases have been addressed through use of the phase scoring, would be prohibitive for the agent to maintain during the client interaction without the use of the system, agent application and GUI discussed herein, especially as the interaction continues for a significant time.

Further, there may be certain legal requirements that need be addressed during a client interaction, for example, a need to state that the conversation is being recorded, and to provide certain disclosures at the beginning of an interaction and/or for products being discussed during the interaction. In some embodiments, the agent application may include/represent such legal requirements as certain keyword/keyphrase within the keyword lists being detected and displayed at the GUI. The agent may then utilize the GUI and/or the keyword list provided thereby to determine whether such requirements have been met. In this way, the agent application and the GUI provided thereby may help to mitigate legal risks of a client interaction.

It will be readily understood that the components of the application, as generally described and illustrated in the figures herein, may be arranged and designed in a wide variety of different configurations. Thus, the detailed description of the embodiments provided is not intended to limit the scope of the application as claimed, but is merely representative of the selected embodiments of the application.

One skilled in the art will realize that the above may be practiced with steps in a different order, and/or with hardware elements in configurations that are different than those that are disclosed. Therefore, though the application has been described based upon the above disclosed embodiments, it will be apparent to one skilled in the art that certain modifications, variations, and alternative constructions would be apparent.

We claim:

1. A computing system for assisting an agent during a client interaction between the agent and a client over a voice communications channel, the computing system comprising:

an agent station having an agent processor configured to:

generate a graphic user interface of the client interaction on an agent display during the client interaction, the graphic user interface to display a current identified keyword and interaction phrase having a current phase score for the client interaction;

receive a keyword and associated keyword information from the client interaction, the associated keyword information including an associated interaction phase and a corresponding phase score; and

update, during the client interaction, the graphic user interface to replace the current identified keyword with the received keyword, and to replace the current phase score with the phase score corresponding to the received associated interaction phase.

2. The computing system of claim **1** where the voice communications channel is routed through a server, and wherein the server further comprises a server processor configured to:

determine a client keyword set including a plurality of keywords and associated keyword information;

provide voice recognition of a client channel and of a client channel of the client interaction;

identify the received keyword from the determined client keyword set based on the voice recognition of the client channel;

determine the associated interaction phase and a weighting factor for the received keyword;

determine the corresponding current phase score based on the weighting factor; and

communicate, during the client interaction, the received keyword and the associated keyword information, including the associated interaction phase and the corresponding current phase score, to the agent station.

3. The computing system of claim **2**, wherein, when the server processor is configured to identify a utilized keyword, the server processor further is to:

identify the received keyword from the determined client keyword set based on the voice recognition of the agent channel.

4. The computing system of claim **2**, wherein the agent processor is further configured to:

display, during the client interaction, all keyword and associated keyword information for the client interaction in a keyword list portion of the graphic user interface during the client interaction.

5. The computing system of claim **2**, wherein the agent processor is further configured to:

display, by the graphic user interface, a positive phase score and a negative phase score for the associated interaction phase, and

where the server processor is configured to:

determine a positive phase score corresponding to the associated interaction phase based on the weighting factor, where the weighting factor has a positive value,

determine a negative phase score corresponding to the associated interaction phase based on the weighting factor, where the weighting factor has a negative value,

communicate the corresponding positive phase score and the corresponding negative phase score for the associated interaction phase, and

wherein the agent processor is configured to:

display, by the graphic user interface, an updated positive phase score and an updated negative phase score corresponding to the received associated interaction phase.

6. The computing system of claim **1**, wherein the keyword is a keyword phrase.

7. The computing system of claim **1**, wherein the associated keyword information further includes a weighting factor, and

wherein the agent processor is configured to:

display the current identified keyword in a first color when the weighting factor has a positive value, and

display the current identified keyword in a second color, different than the first color, when the weighting factor has a negative value.

8. A method of assisting an agent during a client interaction over a communications channel, the method comprising:

providing, by an agent display of an agent station, a graphic user interface displaying a current identified keyword and an interaction phase having a current phase score for the client interaction;

receiving, by the agent station a keyword and associated keyword information, the associated keyword information including an associated interaction phase and an associated current phase score; and

updating, during the client interaction, the graphic user interface to replace the current identified keyword with the received keyword, and to replace the current phase score with the phase score corresponding to the received associated interaction phase.

9. The method of claim **8**, further comprising:

routing the client a server, the method and further comprising:

determining a client keyword set including a plurality of keywords and associated keyword information;

providing voice recognition of a client channel and of a client channel of the client interaction;

identifying the received keyword from the determined client keyword set based on the voice recognition of the client channel;

determining the associated interaction phase and a weighting factor for the received keyword;

determining the corresponding current phase score based on the weighting factor; and

communicating, during the client interaction, the received keyword and the associated keyword information, including the associated interaction phase and the corresponding current phase score, to the agent station.

10. The method of claim **9**, further comprising:

subscribing, by the agent station, to a property change event associated with the client interaction,

wherein the server, upon detecting the property change event, communicates the received keyword and the received associated keyword information to the agent station.

11. The method of claim **9**, wherein the identifying the received key word further comprises:

identifying the received keyword from the determined client keyword set based on the voice recognition of the agent channel.

12. The method of claim **9**, wherein the determining the client keyword set comprises:

determining the client keyword set using one or more of a client identification code and a caller identification notification received during the client interaction.

13. The method of claim 9, wherein the providing the graphic user interface further comprises:

displaying, during the client interaction, all keyword and associated keyword information for the client interaction in a keyword list portion.

14. The method of claim 9, wherein the providing the graphic user interface further comprises:

displaying a current call score, a daily high call score, and an all-time high score,

where the current call score, the daily high call score, and the all-time high score are determined based on the weighting factor.

15. The method of claim 9, wherein the providing the graphic user Interface further comprises:

includes displaying a positive phase score and a negative phase score for the associated interaction phase;

determining a positive phase score corresponding to the associated interaction phase based on the weighting factor, where the weighting factor has a positive value;

determining a negative phase score corresponding to the associated interaction phase based on the weighting factor, where the weighting factor has a negative value; and

display an updated positive phase score and an updated negative phase score corresponding to the received associated interaction phase.

16. The method of claim 8, wherein the providing the graphic user interface further comprises:

displaying a current keyword category associated with the current identified keyword, and

where the receiving the associated keyword information includes receiving a received keyword category, and

where the updating the graphic user interface includes updating the current keyword with the received keyword category.

17. The method of claim 8, wherein the keyword is a keyword phrase.

18. A non-transitory computer readable medium storing program instructions that when executed by a computer cause the computer to perform:

providing, by an agent display of an agent station, a graphic user interface displaying a current identified keyword and an interaction phase having a current phase score for the client interaction;

receiving, by the agent station a keyword and associated keyword information, the associated keyword information including an associated interaction phase and an associated current phase score; and

updating, during the client interaction, the graphic user interface to replace the current identified keyword with the received keyword, and to replace the current phase score with the phase score corresponding to the received associated interaction phase.

19. The non-transitory computer readable medium of claim 18, where the program instruction cause the computer to perform:

displaying, by the graphic user interface during the client interaction, all keyword and associated keyword information for the client interaction in a keyword list portion.

20. The non-transitory computer readable medium of claim 18, where the program instruction cause the computer to perform:

displaying, by the graphic user interface, a current call score, a daily high call score, and an all-time high score; and

updating the graphic user interface including updating the current call score, the daily high call score, and the all-time high score of the graphic user interface.

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